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(Eastman)
MFE

THE MODERN WAY

IN

PICTURE MAKING.

PUBLISHED AS AN AID TO THE
AMATEUR PHOTOGRAPHER.

Copyright, 1905.

EASTMAN KODAK CO.
ROCHESTER, N. Y.

S+3916

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Preface.

OUR first object in the publication of this book is to make photography easier for the amateur. Our second is to show him the way to new pleasures in picture making.

In its compilation we have endeavored to cover fully and clearly every point on which he should have information. With equal care we have avoided useless discussion of theory and have given no space to topics that would not appeal to those who take pictures for the love of it.

Frankly, we have given the preference to work by the Kodak system. We could not do otherwise and be honest with ourselves or with the reader. We have built up this system because we believe in it, because to our mind it means success for the beginner and offers the greatest opportunities to the advanced worker. In its sixteen years of growth, the Kodak system has changed the photographic ideas and methods of the whole world and has made simple and easy a process that was once complex and uncertain.

While we have given prominence to the Kodak method of work, we have nevertheless recognized the fact that there are those who, by choice or because they have other apparatus than ours, still cling to the use of glass plates, and we have accordingly applied the instruction to the whole broad field of amateur photography.

In compiling the book we have not only availed ourselves of the services of our own experts, but have prevailed upon a number of authorities to contribute to our pages—aiming all the time, however, at simplicity. It has been our aim to so arrange the book that the instruction will coincide with the amateur's advancement. Thus we touch lightly upon such matters as composition, timing, etc., in the earlier pages, going more fully into these subjects after treating the simpler forms of technical work and concluding with the more complicated printing methods.

Some of our previous books have proven successful as photographic educators. It is our hope that this, our most ambitious effort in the publishing field, will give the world a still better understanding of photography.

EASTMAN KODAK CO.

Plockton Harbor. H. M. TAPP.

The Camera.

FILMS OR PLATES.

Upon the selection of the first instrument much depends. And in advising we must take into consideration the personality, tastes and pocketbook of the beginner. Yet one rule can safely be laid down. Unless the camera is never to be taken more than a hundred feet from the dark room it must use film. In other words, an exclusively plate camera is all right for gallery work, but is a thing to be avoided by the amateur.

Films in light-proof rolls weigh only one-twentieth as much as glass plates and the necessary plate holders ; they are non-breakable, are as easy to develop as plates, and in rapidity and quality equal the best plates made.

For convenience it is well to have an instrument that will use plates as well as film, although the plate outfit will rarely be used in journeying but is desirable when one wishes to make an exposure or two in or about the house.

LENSES.

Lenses commonly used in hand cameras may be divided into three classes, "Single," composed of one piece of glass, "Single Combination" (sometimes also called simply "Single"), composed of crown and flint glass, and "Double Combination" (often called simply "Double"), consisting of two single combinations.

SINGLE LENSES

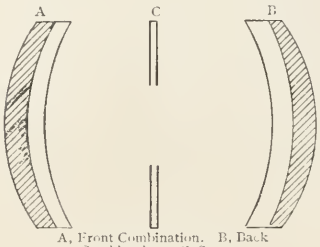
Plano-Convex.

are made in two forms, meniscus and plano-convex. The meniscus form, giving the best definition, is always employed except in the cheapest class of cameras. These lenses are always mounted behind the diaphragm which controls the amount of light to be admitted through the lens.

Meniscus

DOUBLE COMBINATION LENSES

are usually of the form shown in the cut and consist of two meniscus



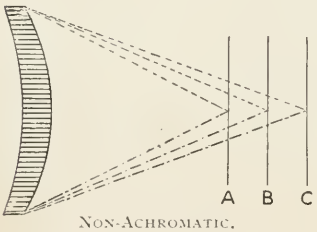
A, Front Combination. B, Back Combination. C, Stops.

DOUBLE LENS.

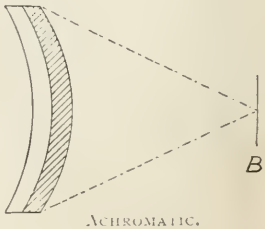
lenses mounted with the diaphragm between.

CORRECTED LENSES.

All glass, when ground into lenses, has the quality of dispersing the different colored rays so that they will not focus at the same point. The



NON-ACHROMATIC.



ACHROMATIC.

rays which act on the sensitive surface are those from the violet end of the spectrum and are called the actinic or chemical rays. The visual rays are from the red end of the spectrum, hence if these rays are separated by the lens the image we see on the ground glass is not the one which will make the picture. Fortunately flint and crown glass have different dispersive powers and, therefore, one can be made to correct the action of the other. Hence if we assume that with a non-achromatic lens, such as shown in the cut, the visual focus would be at C, the chemical focus would be at A. Flint glass bends the chemical rays more than does crown glass, and so by combining a negative lens of flint glass with a positive lens of crown glass, the chemical and visual rays are brought into coincidence, *i. e.*, are brought to focus in the same plane as at B. The lens is then called "achromatic."

In a non-corrected lens even the chemical rays do not all focus at one point, but in small lenses the dispersion may be so slight as to be impossible of detection in the picture by the naked eye.

The difficulties of lens making increase, one might say, in geometrical ratio to the size of the plate to be covered, and many forms of lenses other than those shown have been devised to overcome these difficulties, some of which employ as many as six or eight pieces of glass, but these lenses have really no practical advantage over the simpler forms in such sizes as are commonly used in hand cameras and we shall, therefore, not consider them here.

In very small cameras the best lens is the simplest ; for instance, the lens used in the original Pocket Kodak is a single meniscus non-achromatic, and probably no lens ever had higher encomiums showered upon it. The reason being that it was carefully made, rigidly inspected and tested, and not over-taxed. As a matter of fact, no double achromatic lens could be made that would surpass it in brilliancy or covering power. For larger sizes lenses must be corrected but there is no advantage in a double lens unless 3¼ x 4¼ or 4 x 5, or larger, pictures are desired. Single lenses tend to slightly curve the marginal lines of the picture, but this is unnoticeable in small pictures and is unobjectionable in view work of any size unless the pictures contain architectural subjects. Double lenses can be worked with a larger stop opening than single lenses and are, therefore, quicker, especially in the larger sizes. They are almost essential for 5 x 7 and 4 x 5 snap-shot work and are preferable for 3¼ x 4¼, but below that the advantage disappears.

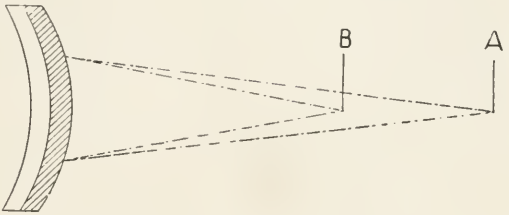
Everything depends on the quality of the work put into a lens. Differences of curve or polish not to be detected except by an expert often constitute the difference between a good and poor lens and only those which have been through the most rigid inspection and trial should be put in a camera by the manufacturer.

"FIXED FOCUS"

lenses are so often mentioned in catalogues and advertisements that the impression has gained ground that this is some distinct kind of lens, with the extraordinary power of focusing all objects near and far in one plane. There is no inherent quality in any lens that makes it "fixed focus"; it is such when it is immovable and that is all. Any lens can, therefore, be made "fixed focus", but the extent to which it will focus all objects in one plane depends upon its length of focus and size of stop or diaphragm used, and upon that only.

The reason for this is that the rays of light from near and far objects do not focus at the same point. For instance, in the exaggerated diagram, page 6, we will assume that B is the point at which objects 100 feet distant will focus and that A is where objects 10 feet distant will focus.

Now the distance between A and B will vary in ratio to the focal length of the lens. In a lens of 3 inches focus it is ascertained mathematically to be $\frac{3}{16}$ of an inch and in one of 12 inches focus, $1\frac{1}{4}$ inches. Hence if using a



3 inch focus lens the sensitive surface is placed between A and B, the object at 100 feet and beyond (all objects beyond 100 feet come practically within one focus) and objects 10 feet distant will none of them be more than $\frac{3}{32}$ out of focus, which, with the size of stop ordinarily used for snap work, creates so slight a blurring of the image that it cannot be detected. Experience has shown that the limit of focus for a lens which is to be employed for snap-shot work with the focus fixed is under 5 inches ; in other words that a $3\frac{1}{2}$ x $3\frac{1}{2}$ plate is about the largest that can be used to advantage under such circumstances. It is probably true that for cameras of this size and under, little can be gained by having the focus adjustable and that, on the other hand, better average results will be obtained with a fixed focus, owing to the fact that there is no adjustment that will allow the lens to be put out of focus by a mistake in measuring distances.

THE CHOICE OF THE CAMERA.

With the products that exist to-day, the hand camera is pre-eminently the most desirable instrument for the amateur photographer, whether he be novice or expert. When amateur photography first began, some twenty years ago, to be popular with the public, there was a general outcry from the small group of old enthusiasts against the "snap-shotter", as he was termed. When, a little later, it came to be recognized that good pictures were possible with the hand cameras, the old-timers looked wise and said that "while admitting the utility of the hand camera, the novice should begin with a tripod camera and educate himself on the ground glass". These "old timers" having learned photography in that way felt that it was the only real way.

But all that has been changed, this change having come about partly through the overcoming of the old prejudices and partly through the perfecting of the hand camera. Nearly all of the best work is to-day made

with hand cameras, 5 x 7 or smaller. 'Tis true that the work you see at the salon is often large, but get back of the picture and you are very apt to find a small negative and most likely a film negative.

On the question of focusing on the ground glass there is a marked difference of opinion. Some first-class workers are satisfied with the finder and scale; others wish to see the image in its full size on the ground glass before they press the bulb; still others work sometimes in one way and sometimes in the other, depending upon the conditions. As a matter of fact, the finders and focusing scales have been so perfected on the smaller instruments that the ground glass is not an essential, perfect accuracy being secured by less troublesome means.

Several styles of Kodaks provide for the use of either the scale or the ground glass for focusing. Most notable of these is the Screen Focus Kodak, which by an ingenious device permits the use of the ground glass, although it takes the regular cartridge film. The Cartridge Kodaks are primarily intended for use with the scale, but when supplied with a plate adapter may be used with the Premo Film Pack, and the ground glass then employed. It will thus be seen that the advantages of film photography may now be enjoyed even by those who feel that the ground glass is essential for some of their work.

Up to a recent date the plate camera was the only instrument permitting the use of the ground glass. Against this the Kodak system offered: Lightness, daylight loading, machine development, and the superior orthochromatic and non-halation qualities of Kodak N. C. film. To-day the Film Pack Adapter gives many of the advantages of the Kodak system while permitting as free a use of the ground glass as the plate system, but with the Film Pack a dark-room is required for development. So far then as the choice of a camera is concerned, the novice should weigh the conditions and decide for himself, bearing in mind that film photography has been forging steadily ahead; that the best workers no longer question the desirability of film for serious work; that machine daylight development has been generally acknowledged as practically and theoretically correct.

No matter then what the size may be, no matter what the lens and shutter equipment may be, no matter what the price may be, the instrument should be adapted to the use of film, and with the tremendous advantage of daylight development taken into consideration, the Kodak Cartridge System should be given the first consideration.

Outside of the question of film and plates and the method of focusing, the important point to be decided is that of lens and shutter equipment. The safe rule is to buy the best the purse will allow, bearing in mind, nevertheless, that satisfactory pictures are made with even the cheapest cameras.

GET ACQUAINTED WITH THE CAMERA.

"How shall I load it?"

The camera obtained, that is the first question which will be asked by ninety-nine people out of one hundred, and our answer is: "Don't load it; at least, not until you fully understand its workings."

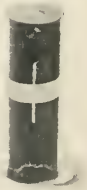
Try the shutter first, working it several times for both time and instantaneous exposures and making yourself perfectly familiar with its action. Also take careful note of the diaphragms or stops and observe how with the larger opening a greater quantity of light passes through the lens in a given time and you will then fully understand why we use the largest opening for snap-shots and the smaller ones for time exposures.

Having mastered the shutter and the focusing arrangement, if there is one on your camera, and having obtained a slight idea of the conditions necessary for successful picture taking, the camera may be loaded.

LOADING THE CAMERA.

On the supposition that you have taken the advice given in the previous pages and purchased a film camera, we will first give you a few hints about loading with film.

WITH FILM.



FILM CARTRIDGE.

With a Kodak this operation is performed in daylight and is very simple. The film is put up in light-tight rolls and extending the full length of the strip of film and several inches beyond each end is a strip of black paper, which, in connection with the flanges on the spool, forms a light-proof cartridge.

After inserting the spool and threading up the black paper the camera is closed and the key turned until the black paper has been reeled off and the sensitive film brought into place in the focal plane. The black paper runs with and behind the film, and at proper intervals is marked in white with the number of the section of film, 1, 2, 3, etc. In the back of the camera is a small red window through which the figures appear as the key is turned. These figures show just how far to turn the key and how many exposures have been made. After all the exposures have been made, a few extra turns of the key entirely covers the film with black paper and the camera may be unloaded in daylight.

It is all as simple as threading a needle (simpler for a man) and with each camera is a manual telling plainly about each step. The amateur

must bear constantly in mind, however, that the black paper must be kept tightly rolled about the film all of the time until it is in place in the camera and the camera closed, for should the film be exposed to daylight for even a hundredth part of a second its ruin would be accomplished.

In the 3½ x 3½, 3¼ x 4¼ and 4 x 5 sizes Film Cartridges may now be obtained for "Double-Two," six or twelve exposures. 3¼ x 5½ may be had in "Double-Two," six and ten, and 5 x 7 in "Double-Two" and six exposure cartridges. The "Double-Two" cartridges contain four exposures, so arranged, however, that two of them may be removed after exposure, or, if desired, the entire four exposures may be made before taking out cartridges.

WITH PLATES.

For loading with glass plates a dark-room is essential, that is, a room from which all white light has been excluded as described on page 83. Provide also a dark-room lamp, a camel's hair brush and a shelf or table on which to work. Remove the dark slides from the plate holders and, having closed every avenue for the entrance of white light and lighted the dark-room lamp, open the box of plates by running a thin knife blade around the edge of the box.

Take one of the plates from the box and put it in the holder face up, handling the plate by the edges. (The face is the dull side.) Dust with the camel's hair brush and insert the dark slide with the word "exposed" next the plate. Now turn the holder over, if it is a double holder, and load the other side in a similar manner. When all the plate holders have been filled close up the remaining plates in the box, wrap them up securely or put away in a dark drawer.

Daylight may now be admitted to the room and the first step in picture making taken.

Those desiring to use plates will find the Kodoid plates an excellent substitute for glass plates. They possess advantages over the ordinary glass plate as they are orthochromatic and non-halation. They are non-breakable and do not curl, and as each one is clamped to a cardboard support they may be used in ordinary plate holders without further preparation and they are but one-third the weight of glass.

Making the Exposures.

SECTION 1.—EXPOSURE.

At this stage of your photographic career you should learn to properly expose the film, then to develop it. When you are proficient in these rudimentary principles, it will be time to take up the simpler methods of printing, after which you will be instructed in the more artistic side of the work.

In speaking of glass plates one refers to the emulsion which is coated on the glass as the "film." In case of Eastman's Non-Curling Film the entire product is so light that the whole substance is referred to as "film." In reality, however, there is a transparent base taking the place of the glass. Upon this the sensitive emulsion is coated. We then have a product which is similar to a glass plate, except that it is light, thin, non-breakable and rollable. The emulsion is the same in each case, the difference being entirely in the support.

Cartridge Films, however, on account of the black paper backing, do not reflect light from the back to the surface, and, therefore, are almost entirely free from halation, a defect which is found very largely in all glass plates unless they are specially prepared. This freedom from halation gives film a far greater latitude in exposure than can be given with plates, and especially adapts it to the conditions of harsh lighting under which the amateur ordinarily works. Everything else being equal, films will, therefore, give better average results than can be secured on glass plates.

A negative is made by the action of light on the silver salts in the emulsion with which the film is coated. Light colored objects reflect strong rays of light and they affect the silver salts the most. If there is a clear sky the rays of light from it will make the sky in the negative opaque or nearly so ; the rays reflected through the lens from a white house will be almost as strong as those from the sky ; the rays from the red brick chimney will affect the negative much less, while so little light comes from the heavily shaded veranda that the negative is hardly affected in this part. We have in the negative, therefore, a record of lights and shadows as we see them, but all reversed. When these are again reversed by making the print, we have them as we see them, for, as in grammar, two negatives make an affirmative, *i. e.*, a positive.

A certain amount of light must strike the film in order to make a negative of proper density. We make a snap-shot out of doors on a bright day in one-fiftieth of a second. If we wish to take a picture indoors on the same day, we must give from two seconds to several minutes, according to the amount of light coming through the windows and according to the color of the walls. If the latter are light in color, the exposure will be much shorter than if they are dark, because they reflect more light. You must have exposure enough, but not too much. You cannot make a snap-shot in-doors, neither can you give a long time exposure out-doors on a bright day without ruining the negative ; you must give approximately the correct exposure. But, fortunately, film is so made as to give quite a wide latitude of exposure. The length of exposure depends first of all upon the intensity of the light.

STOPS.

A volume might be written on the subject of stops, but a few lines will suffice to give the amateur an idea of why they are necessary, and how they should be used.

The best part of a lens is its center, *i. e.*, those rays of light which pass through the lens at or near the center will be correctly refracted and will therefore give the image clear and sharp on the ground glass, while the rays which pass through the outer edges of the lens will not make such a clear and distinct image. It can thus be seen that the smaller the stop opening the sharper the picture, because the outside rays will be cut off. But we find also that with a small diaphragm or stop opening we cut down the light to a great extent. If the beginner has a camera with focusing glass it will be well for him to focus on some object on the ground glass, using the largest diaphragm and carefully noting the lines to see if they are sharp. Then let him put a smaller stop in position, noting the increase in sharpness and the decrease in light. The better the lens the larger the stop opening which we can use successfully, and consequently the "faster" the lens. Suppose we have one lens of 8 inch focus and we find that in a given light we can make a clear, sharp picture in 5 seconds with a stop one inch in diameter, while with another lens of same focal length we must use a stop only one-half inch in diameter in order to get a sharp picture. How would they compare in speed? Nine people out of ten will jump at conclusions and say that we must give the lens with the half-inch opening 10 seconds. In this case the first impression is not correct. We must give four times the time or 20 seconds, because the area of the one inch stop is four times that of the half inch stop. We find that we can get a simple little rule from this and if we know the correct exposure with one stop we can figure for our-

selves the correct exposure for the others: *The time variation between two stops is inversely as the square of their diameters.*

With our single lens cameras there are stop openings of three sizes, the largest, for ordinary snap shots, the second, (which has about ⅔ the diameter of the largest) for snap shots on the water and in tropical or semi-tropical climates or for time exposures indoors, and the smallest, ordinarily used for time exposures out of doors—never for snap shots.

With the double lenses there is a greater number of stop openings and they are arranged upon what is known as the Uniform System, commonly abbreviated to "U. S."

Of course when we say in a general way that the speed of a lens depends upon the diameter of the stop opening we do not mean, for instance, that a Pocket Kodak stop opening must be as large as the diaphragm in the lens of an 8 x 10 camera in order to have the same speed, but it must be as large in *proportion*, and that proportion we find is based upon the length of focus (the distance between lens and plate) of the lens. The proportionate size or the "*value*" of the stop opening is designated by *f*, and is the quotient obtained by dividing the focal length of the lens by the diameter of the stop. Taking, for instance, a lens of 8 inch focus with a stop one inch in diameter and we find that $8 \div 1 = 8$. Hence, 8 is the *f value* of the stop and would be designated: *f* 8. Suppose our stop is ¼ inch in diameter, we would then have $8 \div \frac{1}{4} = f\,32$.

For convenience the Uniform System of marking stop openings has been adopted by nearly all manufacturers of iris diaphragms and the following table will help the amateur to understand the meaning of these markings by giving the *f* value for each one:

U. S. 4 = *f* 8
U. S. 8 = *f* 11.3
U. S. 16 = *f* 16
U. S. 32 = *f* 22.6
U. S. 64 = *f* 32
U. S. 128 = *f* 45.2

The convenience of the U. S. system is at once apparent when we understand that each higher number stands for an opening having half the *area* of the preceding opening. Between each number, therefore, we simply double the time. For instance, the table given on page 20 is for use with stop No. 8 with the No. 4 Cartridge Kodak. If we use stop No. 16 we must give twice, or if No. 32 four times the time of the table, while with stop No. 4 we would give only one-half the time of the table.

Ordinarily the appended table is a good one to follow in the use of the stops with a rapid rectilinear lens, but there are some exceptions:

No. 4.—For instantaneous exposures in *slightly* cloudy weather and for portraits. Do not attempt instantaneous exposures on dark, cloudy days.

No. 8.—For *all ordinary instantaneous exposures* when the sun shines.

No. 16.—For instantaneous exposures when the sunlight is unusually strong and there are no heavy shadows ; such as views on the seashore or on the water, or in tropical or semi-tropical climates ; also for interior time exposures.

Nos. 32 and 64.—For interiors. *Never for instantaneous exposures.*

No. 128.—For time exposures outdoors in cloudy weather. *Never for instantaneous exposures.* The time required for time exposures on cloudy days with smallest stop will range from ½ second to 5 seconds, according to the light. The smaller the stop the sharper the picture.

To get "depth of focus", *i. e.*, have all objects, both near and far, needle sharp, use the smallest stop.

The No. 4 stop is not to be used when absolute sharpness is desired, as the opening is so large that few lenses will have a good "depth of focus" with it—*i. e.*, only the objects at the exact distance focused will be sharp, those nearer by or farther away being more or less "out of focus."

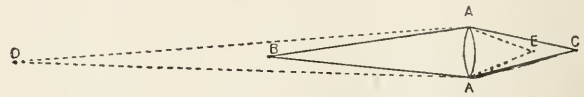
We find in the instruction books for the fixed focus Kodaks having rapid rectilinear lenses that we are told to use the No. 16 stop for ordinary snap shots, while the above table says to use No. 8. The reason for this exception is easily explained, and to avoid confusion and apparent contradiction, should be given: You have, no doubt, often noticed that many photographs are more fully timed in the center than at the edges and, for instance, that you could mark out a place, say, 3½ x 3½ inches in the middle of a 5 x 7 photograph that would be fully timed, while the outer edges were considerably under-timed. Now the lenses on the 3½ x 3½ Special Bullet and Bulls-Eye Kodaks will in reality cover a 5 x 7 plate with the No. 16 opening, and so, by using only the central portion where the greatest illumination occurs, we find it practical to make snap shots with this small opening.

Sharpness is extremely desirable in a picture, but what we call "roundness" and "atmosphere" is perhaps fully as important. What is meant by these rather vague terms is sometimes puzzling to the beginner and they are, perhaps, best explained as referring to that quality in a picture which gives the proper idea of both distance and perspective—that quality which is the opposite of the silhouette ; which makes every object appear in proper relation to every other object and gives life and character to the picture. "Atmosphere" and "roundness" we find by practical experience are somewhat lost by using too small a stop. We should, therefore, use the largest opening which will give us a sharp picture.

FOCUSING.

If your Kodak makes pictures 3¼ x 4¼ inches or larger, you must look to your focusing as well as to the matter of light and stops. The manual accompanying the instrument explains how to do this, but something of the reasons for the necessity of it may be of value to you. It is our intention to make this book intensely practical, yet a bit of theory often helps one in the accomplishment of practical ends.

Suppose we wish to make a picture of an object six feet away ; the focusing point would be (with most lenses used in a 4 x 5 camera) seven inches from the lens. Now again, should we wish to make a picture of an object 100 feet or more distant, we find that the focusing point will be six inches from the lens. So you can readily see that, with a camera of that size, it would be impossible to have a lens always set at the same point or distance from the sensitive surface, for if the nearby objects were in focus (sharp) the distant ones would be out of focus (not sharp), and *vice versa*, and for that reason we have what is called an "adjustable focus" ; that is, the front of the camera or that part which carries the lens is made so that it can be moved and the distance of the lens from the sensitive film or plate be increased or decreased.



A A Lens. C Focus of the rays of light from object B.
E Focus of the rays from object D.

The variation of focus is shown, greatly exaggerated, in the above diagram.

When we say that a camera is "in focus" it is equivalent to saying that the sensitive surface of the film or plate, when in the camera, will come in contact with the rays of light reflected from subject at this point or the point of focus.

TO FOCUS.

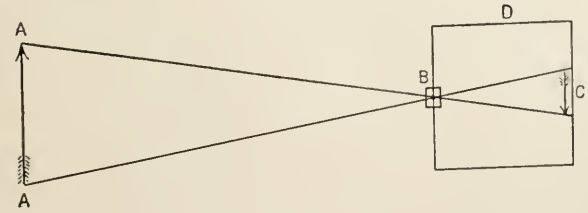
On the Adjustable Focus Kodaks will be found a little scale marked with figures ranging usually from six to one hundred, and indicating feet. (They are also marked for meters.) You will also find a little pointer that, as you move the lens back and forth, will pass over the scale. Now, should you wish to take a picture of an object, say fifteen feet distant, you will move the pointer until it rests over the figure 15. This indicates that the lens has been brought to the proper distance from the focal plane (*i. e.*, the surface of film or plate) for the focusing of objects at a distance of fifteen feet. Objects nearer by, or farther away, will not be absolutely sharp, this, however, depending largely upon the size of stop which you are using. See page 13.

While the adjustable scale for all cameras up to and including 5 x 7 inches will, when carefully used, give one just as sharp pictures as can be obtained by focusing on the ground glass, there is some satisfaction to the student of photography in focusing his camera on the glass before he sets out on his photographic career. It shows him what his lens is doing and why it impresses an image on the sensitive film.

When used with glass plates, the Screen Focus and Cartridge Kodaks and the No. 3 and 3 A Folding Pocket Kodaks may be focused on the ground glass, there being a special Plate Adapter and Focusing Glass for this purpose. However, for the purposes of the study of this question of focus, it is not necessary to purchase an adapter, as the back of the camera may simply be removed and a piece of ground glass laid against the rollers over which the film passes and the picture may be focused on this. Be careful, however, to have the glass of such size that it may be placed in actual contact with the rollers ; otherwise, it will not be in the proper focal plane and the lesson will be lost.

NOTE—The experiment of looking at the image on the ground glass may be similarly tried with the fixed focus Kodaks and will prove extremely interesting and instructive to the beginner.

To accomplish this, place the camera on a tripod, on the window sill or on a table. It will be better to focus on something outside of the house at first as the light will be stronger. Point the camera at some object, a tree, for instance ; put the ground glass in position, use the largest stop and open the shutter. With your head about one foot away and your eyes on a level with the camera, take a piece of black or dark cloth and place over your head and back part of the camera, thus cutting off all light except that entering through the lens. Do not try to look through the ground glass, but at it. In a few seconds, or when your eyes get accustomed to the darkness, you will see a picture on its surface. The picture or image you see will be just what you would get on the sensitive surface of your film or plate. You will, however, notice that the picture is inverted, or upside down. This may excite your curiosity but will explain itself by aid of the following diagram :



Let A represent a tree.
B the lens.
C the ground glass or focusing screen.
D the camera.

The rays of light from "A" passing in a straight line through "B" until they are interrupted by "C," on which they strike, form an inverted image of the object "A."

Now move the lens back and forth

until the tree is sharply defined on the ground glass. When the lens is at just the proper distance from the ground glass, the object will be as "sharp as a needle" even if the largest stop be used. Now focus on objects at other distances. First, on an object one hundred feet or more away and then on an object only eight feet away. You will notice that the farther away the object, the nearer to the focal plane (ground glass) the lens must be in order to give a sharp picture, and vice versa. And you will notice further, if you take the trouble to carefully measure the distances, that your ground glass tells the same tale as your focusing scale,—in other words, if you focus on an object 25 feet distant and get it sharp, that the pointer on the focusing scale will point at, or nearly at, 25. You will also notice that all objects from 15 to 50 feet will be in good focus.

Our factory methods of adjusting the focusing scale correspond closely to the foregoing paragraph. To insure accuracy, the focusing scales are placed on Kodaks by actual focusing. The camera is placed beneath a hood, which serves as a focusing cloth and cuts off all light except that entering through the lens. Incandescent lights are arranged at different distances, which correspond with the figures on the focusing scale. For instance, the camera is first focused on a light 15 feet away, regardless of the scale, which is then so placed on the camera that the 15 foot mark will come directly underneath the pointer. The scale is then fastened in position and tested at other distances, the image on the ground glass being examined with a magnifying glass. Before the camera is finally passed from his department, the inspector makes certain that the focusing scale corresponds exactly with the ground glass at each distance.

While the shutter is open and the ground glass is in position it will prove interesting and instructive to note also the effect of the stops. After focusing on some object with the largest diaphragm, put a smaller stop in position and note the decrease in light and the increase in sharpness over the entire picture. There may be no marked increase in sharpness of the particular object on which you have focused, but nearer and further objects will be sharpened in a remarkable degree. Remember this point later. The above experiment with stops may also be tried with the fixed focus cameras.

Having now something of the theory of photography, you are prepared to make your first negatives. Read carefully the instructions on the making of snap shots and time exposures given in the following pages, having also read carefully the instructions for operating your camera, which are given in the manual accompanying it, you are ready to sally forth and undertake the work of exposure. We advise snap-shot work to begin with, but you should be sure to pick out for your first work a day when the light is strong and brilliant, that your first batch of negatives may be fully timed.

SECTION 2.—SNAP SHOTS.

Instantaneous exposures, or "snap shots", as they are more frequently called, are usually made while the camera is held in the hand and are about the first thing that the amateur attempts. Some learned writers deprecate this, but as snap shots are the simplest exposures to make and ordinarily the simplest to develop, because most likely to be correctly timed, we believe the amateur should begin his photographic career with this class of work.

Before making an exposure, either time or instantaneous, be sure of four things:

FIRST—That the shutter is set properly. (For time or instantaneous exposures as desired.)

SECOND—That the proper stop is in position before the lens.

THIRD—That an unexposed section of the film is turned into position, or that an unexposed plate is in position and that the dark slide has been removed.

FOURTH—Unless the camera has a fixed focus see that it is properly focused on the *principal object* to be photographed.

To take instantaneous pictures the object must be in the broad, open sunlight, but the camera should not be. The sun should be behind the back or over the shoulder of the operator.

NOTE:—Effective pictures may frequently be made by working toward the sun, shading the lens to keep out direct sunlight when so doing, but the amateur should not attempt such work at the start.

SET THE FOCUS.

Set the focus by placing the pointer over the figures on the index plate nearest the estimated distance of the *principal object* to be photographed *in feet.*

It is not necessary to estimate the distance with any more than approximate accuracy. For instance, if the focus is set at 25 feet (the usual distance for ordinary street work), the sharpest part of the picture will be the objects at that distance from the camera, but everything from 15 to 35 feet will be in good focus. For general street work the focus may be kept at 50 feet, but where the *principal object* is nearer or farther away the focus should be moved accordingly.

USE THE PROPER STOP.

It is imperative that a large stop be used in making snap shots. With most cameras the *largest* stop must be used under ordinary conditions with

bright sunlight. This is the case with all of the single lens Kodaks. With the double lens Kodaks use No. 8 stop. See page 13.

This size stop *must* be used for snap shots except where the sunlight is *unusually* strong and there are no heavy shadows, such as views on the water, or in tropical or semi-tropical climates, when the next smaller stop may be used.

The smallest stop must never be used for snap shots or absolute failure will result.

LOCATE THE IMAGE.

Holding the camera steadily, locate the image in the finder. The finder gives the exact scope of view and shows on a reduced scale just what will be in the picture—no more, no less.

HOLD IT LEVEL.

The camera must be held level.

If the operator attempts to photograph a tall building, while standing near it, by pointing upward (thinking thereby to center it) the result will be similar to Fig. 1.

FIG. 1.

This was pointed too high. This building should have been taken from the middle story window of the building opposite.

The operator should hold the camera *level*, after withdrawing to a proper distance, as indicated by the image shown in the finder. Some cameras are equipped with a rising and sliding front to assist in taking in the tops of tall buildings, etc. See page 21.

All being in readiness

Hold the Camera Steady,
Hold it Level and
Make the Exposure.

SECTION 3.—TIME EXPOSURES INDOORS.

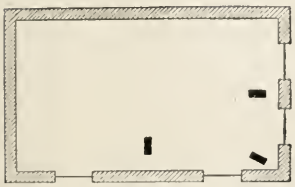


DIAGRAM SHOWING POSITION OF CAMERA.

First put the camera in position. The diagram shows the proper position for the camera. It should not be pointed directly at a window as the glare of light will blur the picture. If all the windows cannot be avoided, pull down the shades of such as come within the range of the camera.

To make a time exposure, place the camera on some firm support, like a table or tripod, focus carefully (this, of course, does not apply to fixed focus cameras) on the principal object and locate the image in the finder.

FOCUSING ON THE GROUND GLASS.

When using plates, or cameras having a removable roll holder, the focusing may be done on the ground glass if desired. The plate or roll holder being removed and the shutter opened, the image may be seen (reversed) upon the ground glass. Cover the head with a focusing cloth of some opaque material and look on the ground glass, *not through* it. Focus by moving the lens back and forward until the picture is sharp. Then close the shutter, insert plate or roll holder and proceed as before described.

If the light is poor the focusing may be done with the largest stop and a smaller one put in position afterward.

Set the shutter and all being in readiness press bulb or lever, as the case may be, to open shutter. Give the proper time (using a watch if more than two seconds) then close the shutter.

TIME NEEDED FOR INTERIOR EXPOSURES.

The following table is an excellent guide for making interior exposures and is based upon the time needed for exposures with the stop ordinarily used for snap shots in single lens cameras, and with the No. 8 stop in all Rapid Rectilinear lenses. When a smaller stop is used the time must be increased proportionately. Where there are figures, greater softness will be obtained in the faces by somewhat increasing this time and the Steadman system of light measurement is recommended. See page 39.

White walls and more than one window :

bright sun outside, 2 seconds ; cloudy bright, 10 seconds ;
hazy sun, 5 seconds ; cloudy dull, 20 seconds.

White walls and only one window :

bright sun outside, 3 seconds ; cloudy bright, 15 seconds ;
hazy sun, 8 seconds ; cloudy dull, 30 seconds.

Medium colored walls and hangings and more than one window :

bright sun outside, 4 seconds ; cloudy bright, 20 seconds ;
hazy sun, 10 seconds ; cloudy dull, 40 seconds.

Medium colored walls and hangings and only one window :

bright sun outside, 6 seconds ; cloudy bright, 30 seconds ;
hazy sun, 15 seconds ; cloudy dull, 60 seconds.

Dark colored walls and hangings and more than one window :

bright sun outside, 10 seconds ; cloudy bright, 40 seconds ;
hazy sun, 20 seconds ; cloudy dull, 1 minute, 20 seconds.

Dark colored walls and hangings and only one window :

bright sun outside, 20 seconds ; cloudy bright, 80 seconds ;
hazy sun, 40 seconds ; cloudy dull, 2 minutes, 40 seconds.

The foregoing is calculated for rooms whose windows get the direct light from the sky and for hours from 3 hours after sunrise until 3 hours before sunset.

If earlier or later the time required will be longer.

As a general rule use a medium sized stop for time exposures indoors.

SECTION 4.—TIME EXPOSURES IN THE OPEN AIR.

When the smallest stop is in the lens the light admitted is so much reduced that time exposures out of doors may be made the same as interiors but the exposure must be much shorter.

With Sunshine—The shutter can hardly be opened and closed quickly enough to avoid over-exposure.

With Light Clouds—From ½ to 1 second will be sufficient.

With Heavy Clouds—From 2 to 5 seconds will be required.

The above is calculated for the same hours as mentioned above and for objects in the open air. For other hours or for objects in the shadow,

under porches or under trees, no accurate directions can be given ; experience only can teach the proper exposure to give.

Time exposures cannot be made while the camera is held in the hand. Always place it upon some firm support, such as a tripod, chair or table.

PRACTICAL HINTS.

In the foregoing pages we have given a bare outline of how to make snap-shots and time exposures, and further on we shall give the details of development. Before, however, taking up the chemical part of picture making, we propose to treat of some of the important details of exposure.

The beginner should expose a roll of film or a few plates, taking both snap-shots and time exposures and developing them as per instructions on pages 72 to 93, before taking up the study of the various methods of portraiture, etc.

SECTION 5.—THE RISING AND SLIDING FRONT.

Occasionally in the taking of photographs of buildings or in landscape photography it is found that the subject cannot all be readily included except by tilting the camera, which would produce the undesirable results shown on page 18. To assist in correcting this fault some cameras are provided with a rising front, which may be utilized in cutting out an undesirable foreground or to assist in taking in the top of a high building, etc. To illustrate this we take the Screen Focus Kodak, which is manipulated as follows:

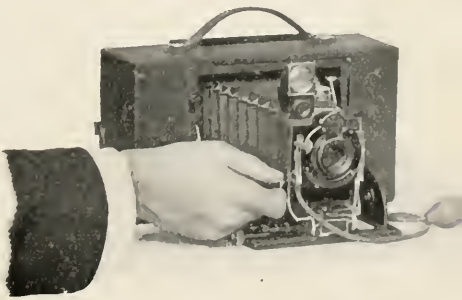


Fig. 1.

Fig. 1 shows how to raise or lower the front. The rising front is controlled by rack and pinion operated by turning milled head, Fig 1. To raise or lower front, pull out on the milled head and it will turn easily. Letting go of the milled head allows pinion to spring back and front is locked.

The front can be moved to the right or left (up and down when Kodak is placed on its side for vertical exposure) by turning to right lever

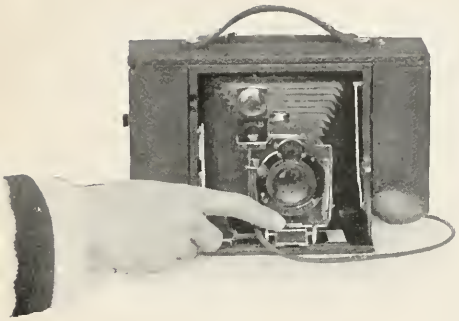


Fig. II.

beneath the shutter, Fig. II., and sliding front in either direction to the desired position. The front is locked in position by pushing lever to left. When through using, repeat operation shown in Fig. II. by sliding front to point in center where it catches and lock it.

In order to make a sharp picture when using the rising front it will be better to use a small stop (No. 32 or 64) and as this in turn necessitates a time exposure, a tripod or other firm support must be provided. Experience alone can teach the many ways in which the rising and sliding front may be used for composing artistic pictures.

N. B.—Do not fail to center front before closing camera as otherwise there is danger of ruining bellows when folding.

On Out-Door Work.

The foregoing sections have given you practical instructions in the manipulation of your Kodak, the selection of stop and exposure for the various lines of work. The question now arises in your mind "What shall I take?" Probably like most beginners you desire to make your first attempts out of doors.

It is hardly necessary for one to leave the vicinity of his own home to find suitable subjects from which to make interesting pictures. This includes those living in the thickly populated cities as well as those of the rural districts, the former giving us as one of the most interesting subjects, "street life." This includes mostly moving objects, the teams drawing heavy trucks, the cars loaded with their passengers, the little old woman who keeps the apple stand at the corner, strange and odd characters frequently seen in most cities, and the newsboy who will nearly always "give you a chance" if you take him right. In the country we find the mill, the rustic bridge, the pond with its bordering rushes, the old boat drawn up on the bank of the creek, an occasional glimpse at a herd of cattle, all of which subjects are good material for artistic pictures and offer numerous opportunities for various compositions, and one to obtain the best results must necessarily have an active sense of perception, a quick eye and hand.

For all photographic work including rapid movement, sunlight is necessary. The nearer the object to be photographed is to the camera the more rapid must be the working of the shutter. If the reader is of an experimental turn, he has fully learned, from his experiences in development, the result of making a snap-shot on a cloudy day.

PHOTOGRAPHING MOVING OBJECTS.

There is probably nothing in picture taking in which the amateur asks more unreasonable things than in the making of snap-shots of rapidly moving objects. If, for instance, he is an enthusiastic bicyclist, he takes his camera to the first race meet, secures a position alongside the tape and as the riders finish, sprinting at a 1:40 clip, he takes a broadside of them from

a distance of ten feet and is disappointed in the resulting blur, for he has nothing else. Now let us see the reason for this.

If he has a double lens instrument with an F. P. K. automatic shutter it has worked in approximately $\frac{1}{50}$ of a second, an apparently very short space of time, but we find on figuring it out that a bicyclist riding at the rate of a mile in one minute, forty seconds, covers 52.8 feet in a second or over twelve inches in $\frac{1}{50}$ of a second, the time the shutter is open—a sufficient distance to ruin the image. The distance the image will move on the plate during exposure is to the distance the object moves, as the focal length of lens is to distance from lens to object. In this case we will suppose the focus of lens to be six inches, and we know the distance from lens to object to be ten feet (120 inches) and the distance the object moves approximately twelve inches. We will let X stand for distance image moves on the plate and it gives us the following equation: $X : 12 : : 6 : 120 = \frac{6}{10}$. Of course, the object moving $\frac{6}{10}$ of an inch on the plate ruins the picture. We find then that in order to take pictures of moving objects at right angles there are two factors of prime importance—the speed of shutter and the distance from the object. In the ordinary amateur outfit the shutter speed cannot be materially increased and we must therefore take the picture from further away. Experiment has proven that in order to successfully take pictures of rapidly moving horses, etc., from a position near by and at right angles the shutter must work in from $\frac{1}{500}$ to $\frac{1}{1000}$ of a second (Muybridge claimed to have used a shutter working in $\frac{1}{2000}$ of a second) and this extreme speed necessitates a special camera and lens as well as a special shutter. But there are tricks in all trades and satisfactory pictures of rapidly moving objects can be readily made by photographing them from partly in front as well as from a reasonable distance. The accompanying picture of the Empire State Express, moving at full speed, shows plainly what can be done in this direction. It was made with a Pocket Kodak and is a good illustration of what can be accomplished by taking the picture from a point at a considerable distance from the object and also somewhat ahead of it. By acting on this hint the amateur can soon learn to take pictures of rapidly moving objects, and in such a manner as to largely avoid the disagreeable blurring.

Empire State Express. WM. BISHOP.

STREET PHOTOGRAPHY.

There are a few points that are essential to all those who are about to attempt street work, one of which is to work quickly, attracting as little attention as possible; another is to be able to take in a pleasing and attractive situation at a glance. By combining these we are enabled to make exposures without the annoyance of useless and sometimes embarrassing questions and situations. This can easily be accomplished if one is familiar with all the workings of his camera, can level it quickly and make the exposure the instant he has the object in the right position in the finder. You will frequently notice upon the examination of pictures taken on the street that a number of people were looking at the camera when the exposure was made. For instance, take a group of boys interested in some game; notice the action, the life and intensity of the scene, which is certainly one of the rare bits of street life. Now if you are active without being conspicuous you will be able to record that scene with all its life and reality; on the other hand, should they become aware of your presence they would undoubtedly lose interest in the game and you would find most of the little group staring at the camera. In that case the artistic value of your composition is entirely lost.

Another important point and one that must not be overlooked is the holding of the camera during the exposure. Many pictures, and we must include those of all classes, show that the point of view from which they were taken was too low. The distance upward from the ground or object upon which we stand to the level of the eyes, or the point of view from which we see our subject will range, in most cases, from four and one-half to five and one-half feet. Now if we hold the camera say ten inches above our knees it can be readily seen that the point of view is radically changed, and that the effect produced upon the eye might be entirely lost if taken from that position. The proper place is against the chest, or as high as we can manage it and still see what is in the finder.

COMPOSITION.

The word "composition" as applied to photography may be summed up in two words, selection and arrangement. Promiscuous snap-shots are, in a way, dangerous, as one gets into a careless habit and is liable to "snap shot" everything within range regardless of composition and those points that go far towards making a picture, and the result is that he often wonders why his pictures lack interest.

One must necessarily study composition, select his subjects and if it is possible, arrange them in such a manner that they are pleasing to the eye. Should they be immovable, such as buildings, street lines, etc., they can be arranged, in a sense, by changing the point of view and selecting that which gives the most satisfactory result. One is frequently able to make pleasing pictures from the most commonplace subjects by giving them attention and study.

LIGHTING THE SUBJECT.

The lighting of your subject is a matter of importance, having much to do with the results obtained and enhancing the value of the composition. Beginners, as a rule, when making exposures in the sunlight, should have the sun behind the back or over the shoulder, but the advancement of the amateur warrants further information on the subject. Effective pictures may frequently be made by having the sun to one side, and at various times the value of the picture is increased by its being a trifle to the front. (In this case it is necessary to shade the lens to keep out direct sunlight while making the exposure.)

For illustration we will take a tree in the bright sunshine ; now if you will take the trouble to walk around it and closely observe the different effects of light and shade you will notice that when you face the tree and the sun is directly back of you that the tree has the appearance of being flat ; as you move gradually to the right or left you will see that part of it is in shadow, and as you arrive at an angle of 90 degrees with your first position you will find that one side is in the sunlight while the opposite side is in shadow, and that it stands out with the pleasing contrast of light and shade, thus giving depth and roundness to the composition of your picture. The shadows are also to be studied. These should be transparent to a degree, always containing detail. Heavy black shadows devoid of detail are always a detriment to the composition of your picture. When the sun is very bright and the lights are strong while the shadows are black, the result with a snap shot would be too much contrast. This can be overcome by a very, very short time exposure, resulting in a softening of the high lights and an added amount of detail to the shadows.

When photographing boats, the point of view to be obtained (if possible) should be such that the shadow effects on the water are made to help the composition.

The above gives one an idea of lighting from which he can work, increasing or decreasing the light and shade according to his fancy.

LANDSCAPE PHOTOGRAPHY.

The photographic study of nature will always remain a chief source of pleasure to the enthusiastic amateur, giving as it does the opportunities, nowhere else obtained, to display his taste in choice of composition, and his ideas of that which is most pleasing to the eye. Care in selecting the best point of view from which to take a subject is of more importance than obtaining sharpness of detail. A question often asked is: "What is good composition in landscape photography?" Another question supplemental to the above: "Are there any rules for composition?" There are, and many, but frequently when we attempt to make use of them they do not fit the subject. (There are, however, some that can be used with entire satisfaction; of those we shall speak later.) So we would say that a good composition is one that is pleasing to the eye, one that leaves you with that feeling which is experienced when you are convinced that you have the best that can be made from the subject in hand, the feeling justified by the result obtained.

Composition needs study, continual study, and to obtain the best results one must necessarily improve his knowledge of the beautiful in nature. that he may be able to select those "bits" which convey to him a feeling of entire satisfaction. To obtain the best results that feeling must necessarily be cultivated. Frequently one fails to see that which is essential to making a good picture, or he fails to distinguish the essentials from the non-essentials; he may have good ideas, but he fails to carry them out.

Do not be discouraged because upon studying the composition of a picture you have made, you exclaim, "Why, that is lop-sided!" or "Look where I have placed the tree!" but give it some thought, convince yourself that the same subject taken from another point of view, perhaps taken at another time of day when the sunlight would certainly change the aspect of the scene, must turn out far different results, then try again. It will frequently happen, there will exist little similarity between the two prints, although both were taken from the same subject, one giving entire satisfaction, the other none.

A mistake often made by the amateur is that he tries to get too much into his picture; in other words, he covers too much field. For instance, he makes a picture containing a bridge, a herd of cattle, a few trees, a small body of water; while the distance may contain a range of mountainous country. A composition of this description in most cases might be divided to good advantage into four or five pictures; the placing of all in one divides the picture into sections, the result is that it fails to be interesting. One should select some one object for his picture; this should be the main point of interest, one that arrests the eye immediately the view is placed

before him. When this has been selected all other features of the composition should be of secondary consideration. If at times it is found necessary to include something that might be a detriment, it is often possible to put it slightly out of focus without destroying the principal object.

The next point is *placing* the main object of interest ; if it can be avoided do not locate it in the center, but rather at one side or the other. It may be the end of a road, perhaps a house in the distance, and to call attention to that fact the lines of your composition should converge towards it. You will often notice upon glancing at the picture of a landscape that the eye is drawn to one point. This is caused by the lines of the composition leading to that point, the object of interest, it having been studied to produce that effect. When taking the picture of a house do not get directly in front of it, but at one side, thereby showing it in perspective. This will also apply to street scenes ; do not take a view of the street from its center, but from one side.

There are a few rules that can in most cases be followed with good results. The horizon line, which in most landscapes is the more conspicuous, should never divide the picture into two equal parts, but should be either one-third from the top or one-third from the bottom. When one has subjects in the near foreground, the line should be about one-third from the top, while for broad, expansive views it should be at the same distance from the bottom. With the latter one should have, if possible, a clouded sky.

FIGURES.

The introduction of figures into the landscape may increase its value ; it may also mar its effect. Figures, to help your composition, should be in action ; in other words, they should not be aware of the fact that they are being photographed. Many of the most beautiful landscape effects contain figures and when the pose is in harmony with the composition the result is always pleasing.

CLOUDS.

Clouds, when possible to obtain, are an advantage in the composition of a landscape, breaking up, as they do, the usual monotony of a blank sky, and adding much to the beauty and interest of the picture. A prettily clouded sky is often the redeeming feature of an otherwise poor composition. Two practical methods of getting good clouds in your prints are given in the special article on page 165.

Pictorial Photography.

Pictorial photography may be broadly divided into two classes ; landscapes and figure studies. Either line is a study of itself, yet so much depends upon the personality of the operator that we can only indicate a few of the qualities, some at least of which are necessary in every real picture, whether photograph or painting. First of all there must be a

Wind Swept. E. W. ENFIELD.

motif, a reason for making the picture. This motif may be one of the following :—to preserve a record of some interesting place or occasion, to picture the beauty of some bit of landscape under certain conditions, to tell a story by means of a picture, or to produce a picture which shall appeal to the observer by its beauty of line or tone. A successful picture may com-

bine more than one of these qualities, but one is always dominant and there should never be any question as to the principal motif which caused its being.

A picture which may be made as a record of some place interesting to the photographer will be greatly enhanced if it gives evidence of good com-

Rusthall Quarry. H. P. ROBINSON.

position and the correct rendering of beautiful tones. Such a result has been attained in "Rusthall Quarry" by Mr. Robinson. Note the beauty of composition both in the lines and the masses of light and shade. This print is what may be termed a "record of fact", but it is nevertheless a beautiful picture, one which would appeal to the observer for its own sake.

The Tramp of Many Feet. MISS LILLIAN S. OWEN.

Much has been written about the study of the rules of composition but we would impress upon the reader that composition is not an exact science to be learned like the multiplication table. A few of the elementary rules of composition which are principally in the form of "don'ts" will certainly help the novice but the study of beautiful pictures will be of far greater assistance to the ambitious beginner. Avoid dividing the picture space (viz. all within the boundary lines of the composition) into equal parts by straight lines. If your subject is such that the horizon line is irregular as in "Wind Swept" much is gained. This is a picture which interests one largely because of the varying gradations, both in the sky and foreground. Take note of the beautiful range of tone caused by the play of light upon the sand in the foreground. The sky is not one large expanse of white paper, but of delicate grey tones. Such a sky gives the real effect of luminosity.

The introduction of animal life into the composition often gives us a story telling picture. This is well shown in "The Tramp of Many Feet" where the artist has not lost sight of the value of beauty in the composition and the rendering of

A Study. LAURA ADAMS ARMER.

atmosphere. Here we have an effective example of contrasting lines ; the strong vertical lines of the tree trunks in the left hand side of the picture echoed by the tree trunks in the distance upon the right are beautifully contrasted with the curving mass of sheep straggling up the hillside. And the sense of aerial perspective given by the haze over the roadway through which we just see the shepherd and the hill away beyond is superb.

Landscape pictures containing figures are of two kinds ; those in which

Le Peintre. M. M. LAILLER.

the landscape is of greatest importance with the figures as accessories and those where the landscape furnishes the setting to a figure, a group of figures. "Le Peintre" by M. M. Lailler is an excellent example of the latter class. The very positions of the two men at the left of the painter, so busy at his canvas, denote absorbing interest. The single figure of the boy, who apparently would like to get a closer view of the canvas, did he but dare, standing out so prominently against the shimmer of the water, serves to balance the picture. Place your finger over the figure of the boy and you will at once see how one sided the composition would be without him. This picture and "A little Lunch", show not only what can be accomplished

with the Kodak, but are pictures which could hardly be made with anything but a hand camera. Such pictures are sometimes said to be merely accidental, but in the truest sense this is not so. They may be accidental in their grouping and the combination of tone and atmosphere, but it was not accidental that the Kodaker grasped the opportunity nor that he was able to make negatives and prints giving such evidence of artistic feeling.

In all nature, what is more beautiful than the human face and figure? Artists of every age and working in every medium have striven to give voice to that beauty. That such work is within the range of the Kodak is made evident in "A Study" by Laura Adams Armer. Such a picture may not appeal to many people because it tells no story in a literal sense. But it does tell the story of Beauty. Beauty of Character is certainly shown in the face of the subject as well as beauty of line and tone in the print. The picture is decorative in its composition. Note how effectively the oval lines of the mirror are contrasted with the long severe and almost straight lines in the gown. There is also much to admire in the tonal qualities of the picture.

"*A Little Lunch.*" MRS. HELEN P. GATCH.

Again we would say if you wish to make beautiful pictures, study composition and study pictures. When you see a picture that appeals to you, ask yourself the reason for its so doing. Learn to recognize the qualities that make a picture successful. Remember the few following simple rules of composition ;—Do not divide your picture space into equal parts by having the unbroken horizon line cross the center. Always place your principal object either above or below and to one side of the center. Do not let your picture be one sided by having a heavy mass of shadow or

tone near one edge unless there is some smaller dark spot near the opposite end to balance the composition. Try to get atmosphere and correct tonal values into your picture, the first by working when the conditions of light are suitable, and the second by correct exposure, development and printing. And finally aim for simplicity. Do not crowd your picture with meaningless details. In this short article we have striven to give a few ideas which would start the novice in pictorial photography in the proper direction. Remember no matter how good the work you may do there is always room for improvement, and always something to learn in the making of pictures.

Portraiture at Home.

There is no more interesting branch of picture making than portraiture, and the required accessories can be found in every home. To attain good results it may take a little patience and study, but for all this, the amateur will be well repaid in the satisfaction brought by his first successes. Portraits may be made either indoors or out, in the daytime by the light of the sun or by night by the aid of the flashlight. The following lectures dealing with the subject thoroughly cover the ground and should be carefully studied by those desirous of making portraits.

HOME PORTRAITURE.

By FRANK MORRIS STEADMAN.

The author of this article, in company with Mr. G. E. Trager, has practiced "Home Portraiture" with a Kodak for eleven years, with the most notable success. The wide difference in the light conditions in the various houses where the pictures have been made, rendered it necessary to have some accurate means of measuring the intensity of light, and after considerable experimenting, Eastman's Solio Paper used in connection with simple tables, was adopted as the exposure meter, with such success that the proper timing of negatives ceased to be one of the questions in practice.

During the last four years in which the Solio has been employed for measuring light, not a single failure has been made in exposure, unless perhaps through forgetfulness in placing the right diaphragm. Eastman's Transparent Film has been used entirely in this work, and during the winter of 1902-3, which was spent in Merida, Yucatan, fully two thousand exposures were made and the negatives developed in the Kodak Developing Machine without the loss of a single one.

The term "*Solio Time*" used in this book expresses the actinic intensity of an illumination, and it should be used just as other simple terms are used to express other quantities or conditions, as: "The Solio Time at this head is eight seconds." "The Solio Time of this landscape is one-half second." Just as one would say: "The length of this stick is four feet;" or, "The temperature of this room is seventy degrees."

The adoption and use of this term for the expression of actinic values or intensities will do much to solve the problem of photographic exposure.

The "Solio Time" at any subject being once known (by measurement with the Solio Paper) the exposure becomes simply some modification of that time according to the color and contrast character of that subject, and the selection of a certain diaphragm.

To obtain the greatest universal good from the use of this unit expression for actinic intensity, the photographic workers should use some method of counting exact seconds, such as the one given in this article.

The most delightful phase of photography is portraiture. If in the past it has been considered most difficult by the amateur, it has been because of a lack of clear and concise instructions how to proceed.

Generally, the greatest difficulty in portraiture is the lighting of the subject and the timing of the exposure. The object of this book is to present a most simple, and at the same time accurate method of determining the right exposure to give; and to offer suggestions as to lighting which will enable the amateur to make good portrait pictures.

LIGHT IN PORTRAITURE.

In home portraiture a window having a full view of the sky should be selected if possible. It should preferably be on the shady side of the house so that the sunlight will not enter it. If the window is low, pin a dark cloth across it covering as high up as the subject's head, so that light will not come up from below on to the face and strike the lower part of the features and spoil the modulation. See that no brightly lighted part of the room, as a window or door, is in range of the lens.

PLACING THE SUBJECT.

Place the subject about the width of the window away from one of the casings. Turn the face exactly toward the window and then have the subject turn the head gradually away until one side of the nose is seen to become shaded and the shadow of the nose rests somewhere on the cheek. The light must strike a little upon both eyes and both cheeks. The eyes should look in the same general direction that the face is pointed. This is the lighting with which at least ninety per cent. of all portraits, which are intended as likenesses, are made, whether in painting or photography.

It is the light that best models all the features of the face, and therefore best reproduces the likeness of the subject. Now place the Kodak so as to take in the view of the face that is desired. Reference to the accompanying diagrams will help you. Adjust the Kodak at the proper height. The lens should, for a bust portrait, be about on a level with the nose.

DISTANCE AND SIZE OF PORTRAIT.

Full figures are made at about 11 ft.
Three-quarters figures are made at about 7 ft.
Medium busts " " " " 4 ft.
Large size busts " " " "3½ ft.

If you have one of the small fixed focus Kodaks and are using it with a portrait attachment, the Kodak should always be set at exactly 3½ ft. from subject ; otherwise, it will be out of focus.

If you are using a No. 3 or No. 3A Folding Pocket Kodak, or Cartridge Kodak, with the portrait attachment, the directions furnished will enable you to place the Kodak at any distance desired away from the subject and obtain a portrait of any size you choose.

If desired the Cartridge Kodaks may be fitted with an additional focusing scale for close work. See page 70.

THE STOP FOR PORTRAITURE.

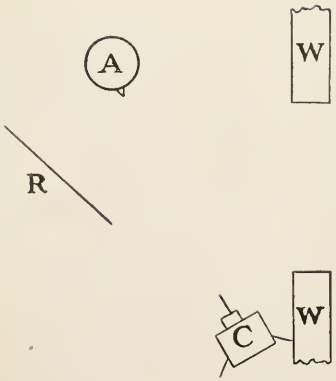
In portraiture, always use the largest diaphragm there is in the lens in order to diffuse the background and to gain speed in the exposure. With those Kodaks which have rapid rectilinear lenses and shutters with stop openings numbered on the U. S. System, use stop No. 4. With the other Kodaks use the largest stop.

In the following pages are given diagrams showing the position in which to place the subject with reference to the light, together with the proper location of camera and reflectors. A careful study of these diagrams and of the portraits accompanying them will be of the utmost advantage in home portraiture work.

REFLECTORS.

With the subject placed in the position desired it will be seen that the light on the window side of the face is much stronger than on the shadow side. The contrast must be lessened by the aid of one or more reflectors, marked "R" in the diagrams. White towels will answer the purpose well. In your first experimenting, move this reflector close to and then away from the face, noticing the absolute control it gives you over the strength of the shadows. In the "line" lighting and the "three-quarters" view it may be necessary to insert a dark cloth somewhat between the face and the window so as to reduce the strength of light on the front of the face. This should be done only *after the reflectors are in place* and it is seen that the contrast is still too great. The reflectors and screens may be held in place by assistants. Look at the illustrations and see what a great number of different lightings may be obtained. Illustration No. 5 shows the subject

No. 1. Front View.
KODAK NEGATIVE.



Arrangement for No 1.

W. W.—Window casings.

A.—Subject. The pointer indicates direction in which face is turned.

R.—Reflector.

C.—Camera.

To obtain this lighting place subject opposite one of the casings and about the width of window away. Set camera and reflector as indicated. Have the face turned so that the side of the nose away from the window is shaded, while the light touches the cheek upon that side. *See pages 36, 37 and 39*

against the casing, and Nos. 3 and 4 almost against the window glass. It is seen therefore that there need be no fear of having the subject close to the window. With children it is advisable to raise the lower part of the sash and place them against the side of the window farthest from the Kodak. Keep the direct light from the sky from shining into the lens. Never allow the lower edge of the reflector to drop lower than the lower part of the face; otherwise, the reflected light coming up from below will "flatten" the cheek on the shady side. Also keep the reflector well forward.

See that the position of the subject is natural and characteristic. Forced positions should be avoided. Vary slightly the positions of head and body.

When working with Cartridge Kodaks for busts, the Kodak cannot be aimed by looking in the finder but must be "sighted." The question of height can be easily determined by standing back a few feet so as to view both camera and sitter. To center the image stand behind the camera and sight over the top. A pencil laid over the top of the Kodak should point at the eyes.

MEASURING THE LIGHT.

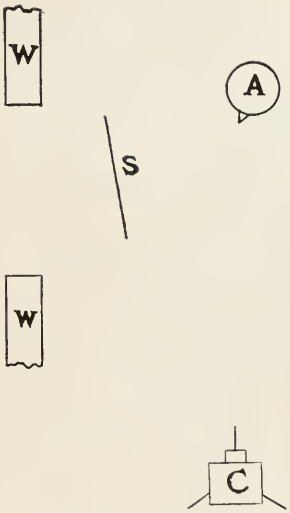
TIMING THE EXPOSURE.

Now comes a very important part of the work—measuring the light—in order to give the correct exposure. The system of measurement which the author herewith presents has been practiced by him with the very best results. The system is based upon the fact that Solio paper made by the Eastman Kodak Company is constant in its sensitiveness to light.

To take the measurement of the light, expressible in seconds of time, proceed as follows:

Provide a strip of thin cardboard or heavy opaque paper about two inches wide and six or eight long. Fold this across the center so the cardboard will resemble the cover of a small book and near the end of one flap cut a small square hole.

Place a fresh strip of Solio, with the face up, under the hole and cover the opening with a coin. Hold this cardboard as near as possible to where the face of the subject is to be placed and so that the hole exactly faces the light. Then remove the coin, expose 32 seconds and replace; now raise the cover and look at the tint on the Solio. It will probably be very pronounced. Pull the strip up slightly so as to bring it to a fresh place and give an exposure of 16 seconds. If the discoloration on the Solio is still very plainly visible, give another exposure of 8 seconds; then one of 4 seconds; then one of 2 seconds in order that you may discover the shortest



W. W.—Window casings.
A.—Subject. The pointer indicates direction in which face is turned.
R.—Reflector.
S.—Opaque screen to reduce slightly strength of direct light.
C.—Camera.

ARRANGEMENT FOR NO. 2 THREE-QUARTER VIEW.

To secure this lighting, place subject opposite one of the casings, the width of the window away. The position of the head is the same as in No. 1, front view, the camera in this case being farther from the window; the reflector occupying about the same position as in No. 1. *See page 38.*

NO. 2. THREE-QUARTER VIEW.
UNRETOUCHED NEGATIVE. MADE WITH CARTRIDGE KODAK. DEVELOPED IN KODAK DEVELOPING MACHINE.

number of seconds that will give a just plainly discernible discoloration to the Solio. This is the "Solio Time." Therefore, *the "Solio Time" of any light is the number of seconds it has taken to give a barely discernible tint to the Solio paper in that light.* On account of the great latitude of Eastman film, sufficient accuracy will be obtained by taking the Solio Time in even seconds such as 1, 2, 4, 8, 16, 32 seconds; or 1, 2, 4, 8, minutes, etc.

No. 3. Variation of No. 6 (page 22).
THE SUBJECT'S HEAD AGAINST THE WINDOW GLASS.
KODAK NEGATIVE.

COUNTING TIME.

It is not always practical to use a watch in counting seconds. After a little practice, however, one can learn to count seconds with great accuracy without a watch by counting in the following way: (Begin with naught)

Naught
one — half — and — one
one — half — and — two
one — half — and — three, etc.

Practice counting by the second hand on a watch, giving the accent on the words, one, two, three, etc., so as to keep track of the number of seconds that have been counted. When the "Solio Time" at a certain point has been ascertained, it becomes very simple and certain to give the correct exposure by reference to the following tables:

Table "A" is for use with the Kodaks having rapid rectilinear lenses and the numbered stop openings on the shutter.

Table "B" is for the fixed focus Kodaks which will not work with so large an opening as the others and which will therefore require a longer exposure.

TABLE "A."

Stop U. S. 4 or *f*-8 for Cartridge Kodaks, No. 3, No. 3A Folding Pocket, and No. 4 Screen Focus Kodak.

Very fair complexion,	give	1/8	Solio	time.
Average	"	"	1/4	"	"
Very dark	"	"	1/2	"	"

For instance, if it has taken 8 seconds to create the standard tint on the Solio, the proper exposure for an average subject would be 1/4 of that time, or 2 seconds.

TABLE "B."

Largest stop with Single Lens Kodaks. Flexo, No. 2 Bulls-Eye, No. 4 Bulls-Eye, No. 0, No. 1, No. 1A Folding Pocket Kodaks, and the Brownie Cameras of all styles and sizes.

Very fair complexion,	give	1/4	Solio	time.
Average	"	"	1/2	"	"
Very dark	"	"	Full	"	"

It will be found that by carefully ascertaining the Solio Time and giving accurately the exposure indicated, perfectly timed negatives will always be obtained.

It is not difficult to give the exposure in just the number of seconds or fractions of seconds required by the table. Suppose the worker has a Kodak with a shutter having pneumatic attachment. Set the lever at "B" and to make 1/8 of a second exposure, press and release the bulb as quickly as possible. To give a quarter second, press and release the bulb while saying "quarter" at talking speed. For half a second say "Naught—One-Half", always pressing at the first and releasing at the last syllable; and for one second, "Naught—One-half and One". With the fixed focus Kodaks and Brownies, work the shutter lever of course instead of pressing the bulb. Use a tripod or other firm support.

DEVELOPMENT OF NEGATIVES.

The most satisfactory results in development can be obtained by developing film in the Kodak Developing Machine. Develop four to five minutes, otherwise follow the instructions in the manual. If the negatives are generally too dense or too thin to suit the operator, vary the length of development as desired.

PUBLISHER'S NOTE. The Kodak Tank Developer was not on the market when this was written.

REDUCTION.

When either reducing or intensifying is to be done it is desirable to use a freshly mixed hypo bath for fixing—otherwise stains may result and the negatives are liable to fade after intensification. If any negative is more intense than is desirable for the paper that is to be employed, it may now be reduced to the desired point in the

REDUCER,

Ferri-Cyanide of Potassium, - - -	Volume of a pea.
Hyposulphite of Soda, - -	6 to 10 times that volume.
Water, - - - - - -	About a quarter of a glass.

Flow this solution over the negative to be reduced until the desired intensity is reached, after which it should be washed and dried in the usual manner.

If the bath works too fast with the quantity of water, add more water.

Negatives may also be reduced locally by applying this solution (which should then be mixed with less water so as to work faster) to the part that is too intense, with a camel's hair brush or a tuft of absorbent cotton.

To reduce locally, lay the negative on a ground glass and have the light strike the glass from below so that the work may be done by transmitted light.

No. 4. Variation of No 2.
THE HEAD RESTING AGAINST THE GLASS. KODAK NEGATIVE.

A frame made to hold the glass will leave the hands free for the work.

No. 5. Variation of No. 1.
THE SUBJECT'S HEAD AGAINST THE CASING. KODAK NEGATIVE.

An incandescent electric light may be placed under the glass, or a mirror may be placed in the frame so as to reflect the light of a lamp up against the glass.

By adding only a very little water to the reducing agents the reduction may be made to act in a second or less and the worker, with a little practice, can obtain by the quantity of water added just the strength or speed of action that is desired.

In reducing very small parts, have the surface of the part, as well as the brush, free from excess of liquid, so that the reducer will not flow or run to adjoining parts; have some wet cotton in the left hand to pass over the part as soon as the right intensity is reached.

If desired, a reduced negative may be intensified, after it is washed in three or four clean waters.

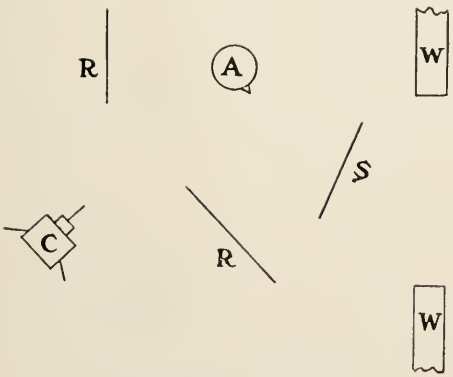
INTENSIFICATION.

If for any reason a negative is not sufficiently intense or contrasted, it may be intensified, either generally or locally, in the following solution:

No. 1.	60 grains of Bi-Chloride of Mercury (Corrosive sublimate) Poison, in - - - -	8 oz. water.
No. 2.	75 grains of Iodide of Potassium, in - -	1 oz. water.
No. 3.	120 grains of Hypo, in - - -	1 oz. water.

Dissolve separately and combine No. 1 with No. 2, and the resulting mixture with No. 3.

No. 6 Line Lighting.
KODAK NEGATIVE. DEVELOPED IN KODAK DEVELOPING MACHINE.



Arrangement for No. 6.
LINE LIGHTING.

W. W.—Window Casings.

A.—Subject. The pointer indicates direction in which face is turned.

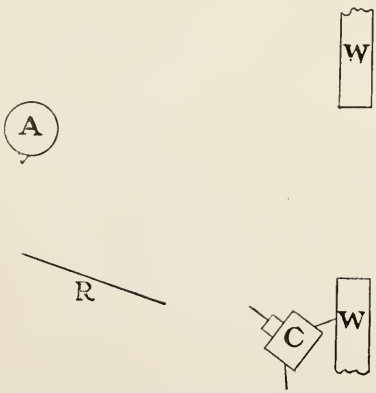
R.—Reflectors.

S.—Opaque screen to slightly reduce strength of direct light.

C.—Camera.

For this lighting note exactly the position of head as shown in above diagram. Be sure that the window does not become part of the background, as seen from camera. Two reflectors are necessary, the camera focusing between them. And if the contrast of light on the face is still excesssive, the screen S must be used to diminish direct light. *See page 37.*

No. 7. Back Lighting.
MADE WITH CARTRIDGE KODAK. DEVELOPED IN KODAK DEVELOPING MACHINE.



Arrangement for No. 7.
BACK LIGHTING.

W. W.—Window casings.

A —Subject. The point indicating direction in which face is turned.

R. – Reflector.

C – Camera.

In this lighting the subject is somewhat farther away from the casing than the width of the window. In placing the reflector, care should be taken not to have it exactly in front of the face or it might show a reflection in the eyes.

To dissolve the mercury easily, place it together with the water, slightly warmed, in a mortar and grind it.

Guard the intensifier in a wide mouth glass stopper bottle and keep it in a secure place, as it is extremely poisonous.

Before intensifying see that the films have been thorougly fixed in the fresh hypo bath as recommended, and then washed in four or five changes of water for at least five minutes.

After intensification, wash and dry the films in the usual manner.

To intensify negatives to too great a density is extremely disastrous in producing the disagreeable "black and white" effects, and should be carefully avoided.

Negatives should be reduced and intensified directly after fixation, as already described, as at that time the gelatine is softer and more evenly and surely acted upon by the solutions. If, however, it is desired to treat a negative that already has been dried, it may be done by previously soaking it for 20 minutes in water.

FRONT VIEW. SAME AS NO. 1.
MADE WITH CARTRIDGE KODAK.
DEVELOPED IN KODAK DEVELOPING MACHINE.

INTERIORS.

In taking the interiors of rooms be careful that no light, window or door, lies in front of the lens. See that the Kodak is set perpendicularly.

The method of exposing by the "Solio Time" may be followed for interiors with just as satisfactory results as in portraiture. In interior work, however, it is necessary to use a smaller stop. With the Kodaks having the rapid rectilinear lenses and shutters with the numbered stop openings,

stop U. S. 32 (or *f.22*) is usually small enough. With the fixed focus Kodaks, use the medium stop. Then, having ascertained the "Solio Time" in the room, the time necessary for exposure may be easily found by reference to the accompanying table :

TABLE "C"—FOR INTERIORS.

Stop No. 32 U. S. or *f.* 22.

White walls,	Give ½ Solio Time.
Medium walls,	Give Full Solio Time.
Dark walls and furnishings,	Give Double Solio Time.

TABLE "D."

For medium stop with fixed focus Kodaks.

White walls,	Give ½ Solio Time.
Medium walls,	Give Full Solio Time.
Dark walls and furnishings,	Give Double Solio Time.

In interior work measure the light or take the "Solio Time" at some piece of furniture three or four steps from the window or main source of light, or get the "Solio Time" in the following way, if the room is rather dark :

Measure the distance from the window to the nearest piece of furniture, which should be placed not nearer than three or four steps from the window. Take the "Solio Time" at a point ⅓ the distance from the window to the piece of furniture. Ten times that "Solio Time" will be the working "Solio Time" for the room. Have no furniture closer than about three steps from the lens and set the distance pointer at 12 or 15 feet, when the whole room will be sharply focused.

Out-of-Door Portraiture.

Probably no branch of the photographic art is followed by more people than out-of-door portraiture. It seems to be the aim of almost every novice to make portraits of his friends or family, and on account of the abundance of light many beginners make their early attempts out of doors.

There is, however, a great difference between a properly made portrait and the under-exposed snap shots made by so many beginners, and in fact by many who are no longer such.

It is not a difficult matter to succeed in this interesting work if one will but give a little time to the study of conditions and approach the subject in an intelligent manner. Three things must be carefully considered—light, exposure and background. Light is the first consideration. Intense sunlight should be avoided for it produces pictures with chalky highlights and unpleasant shadows. The light which you will obtain upon a shaded piazza is almost sure to be satisfactory. By placing your subject near one end of the piazza almost any effect of lighting may be obtained by shifting the camera and turning the subjects face to or from the light. If the house is painted a light color, sufficient light will usually be reflected upon the shadowed side of the face without the aid of a reflector. Should it be found necessary however, the reflector described on page 69 may be utilized to lighten up the shadows in precisely the same way as described in Mr. Steadman's article on Home Portraiture, pages 35-48. Charming pictures may often be made in a garden or upon a lawn when the conditions of light are favorable. By working when the sun is hidden behind fleecy white clouds a very fast light is obtained and portraits may be made in any part of the garden or grounds without fear of harsh lightings. Such conditions are particularly desirable when photographing children, for a slow instantaneous exposure may be made while holding the camera in the hand. Often a picture of a child taken under such conditions is highly pleasing to the parents, for it shows the child amid the most familiar surroundings. Beautiful effects of lighting may sometimes be made by working in the direct sunlight when the sun is low in the latter part of the day. And in the numberless effects of lighting that may be obtained by the persistent worker lies one of the great charms of out-door portraiture.

EXPOSURE.

Portraits, whether indoors or out, should always be fully exposed. A full exposure with proper development insures a truthful rendering of the light and shade upon the subject. Chalky white faces and black shadows which under-exposure and forced development always produce must be avoided. The method of determining proper exposure for indoor portraits described in Mr. Steadman's article (pages 35-48) may be employed to excellent advantage for out-door portraits as well. But whatever method you employ for determining exposure, remember that it is always better to over-expose than to under-expose.

BACKGROUNDS.

The beauty of a portrait always depends largely upon the selection of a background. Many otherwise fine pictures are completely spoiled by an ugly or inappropriate background. When working upon a piazza, a background may be provided by stretching a sheet across the end. Or for a dark background a brown or red blanket may be used. A door opening into the house with the figure in the doorway makes a good combination. When working about the garden or grounds of a house a natural background should always be sought. Shrubbery, vines, dark shadows under the trees are but a few of the many possibilities. Avoid carefully such abominations as the clapboard side of a house and picket fences.

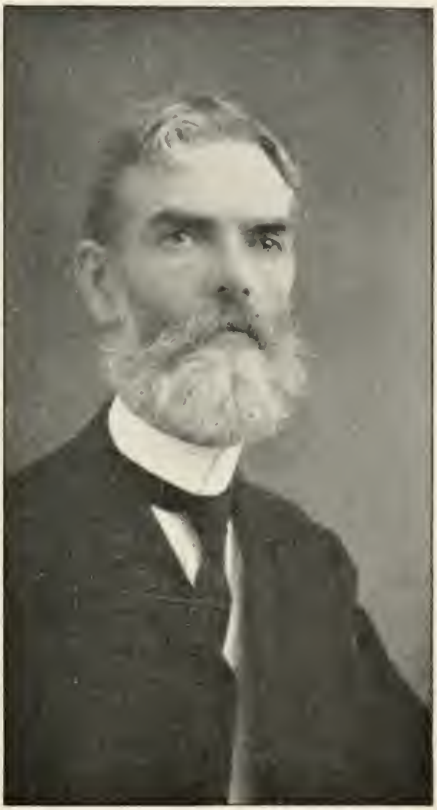
In conclusion a word might be said in regard to development. Aim for gradation and softness in your negatives. If you use the Developing Machine a little experience will tell you the length of time which gives the most pleasing results. If you develop in the dark-room by hand it is well to use a rather dilute developer and be very careful not to carry development too far.

Amateur Portraiture by Flashlight.

BY W. S. RITCH.

Publishers Note.—The reader may be struck by the fact that Mr. Ritch uses a considerably stronger flash than recommended by us on pages 65-69; this apparent discrepancy is largely accounted for by the fact that in every case he recommends the use of a screen or filter between the light and the subject.

To say that the flash has decided advantages over daylight for doing really serious work in portraiture would seem ridiculous to many people; but it is a fact that any effect which can be had with daylight can also be made with the flash by the proper placing of the light and reflector. Most beautiful work has been done with the flash of late years both by professionals and amateurs, but the fact that the pictures were made by flashlight being unknown, the general public believe them to have been made with daylight, and the prevailing idea of a flashlight picture seems to be those soot and whitewash things of evening party groups.



NO. 1.

Wall paper, medium dark, ceiling light, No. 3 Flash Sheet 7 feet distant. Stop No. 4. Face turned toward L. Light at L. Diagram No. 1.

That the best work can be done with the flash is owing to the great superiority of lenses and flash material made in recent years over those of past times. By the use of the flash the subject can be seated anywhere in the room, which may be most convenient, and with the camera at the proper distance, the flash can be placed anywhere it is deemed necessary to make the desired lighting. The merest beginner can make fine portraits by this method, as no special apparatus is necessary and only a few simple rules must be observed. To use an Eastman Flash Sheet it

No. 2.

Wall paper rather light, No. 3 Flash Sheet, 8 feet distant, in order to cover full figure and surroundings. Stop No. 8. Face turned toward M. Light at I.

is only necessary to obtain a strip of wood about eight feet long on which to pin the sheet. If this strip is tied to the back of a chair in an upright position, it can be moved about the room and placed in any position without inconvenience. The sheets are best to use whenever the subject is one who has enough self control to remain quiet during the burning of the sheet, which takes about one second; but for nervous people and little children, it is necessary to use the cartridges as these are practically instantaneous, and by their use we can catch the little ones in their own

No 3.

Wall paper, rather light, No. 2 Flash Sheet, 6 feet distant. Face turned toward L. Light at J.

naturally graceful poses, at play, at work, resting or doing just as they please. It is only necessary for us to have a little patience and focus and arrange the light while they are interested in what they are doing. If you want to make beautiful pictures of children, do not have any preconceived idea of what you want; simply do not disturb them; they are making the pictures continually and it is only for you to catch them on your film.

All flashlight cartridges should be handled with much care as the contents are explosive not only by the application of heat but sometimes from friction or concussion. If handled with proper precaution, however, there is very little danger. The writer uses this kind of flash a great deal

as he is fond of photographing children, and he has never yet had an accident of any kind.

He begs leave to offer the following suggestion in regard to the use of the Eastman Spreader Cartridges in connection with the Pistol: Take a strip of wood about eight feet long and fasten the pistol to the end with a couple of nails or screws. Then by attaching a stout piece of picture wire to the trigger of the pistol and letting it run down the side to the other end of the pole, you have as handy a flash machine as can be made. The advantage of this machine over holding the pistol in the hand is that you can now sit by your camera where you can watch the subject from the same point of view as the lens and you can put the light in any position desired to make the proper lighting. Be careful, however, not to put it near lace curtains or other inflammable material as the light spreads out from the cartridge and might cause damage if placed too close.

No 4

Surroundings rather dark, No. 2 Flash Sheet, 6 feet distant. Stop No. 8. Face turned toward B. Light at F.

Besides a light, another requisite for doing good flash-light work is a plate or film which is rapid, orthochromatic and non-halation. Do not try to make a portrait with the flash on any plate not possessing every one of these qualities, and as these qualities are all combined in the N. C. Film, we have here a medium which is ideal for this work. Of course, these qualities are a great advantage in all photographic work, but it is just such material as the flash sheet and N. C. Film which make flashlight work so much better than we have formerly seen of the soot and whitewash order.

Now for the modus operandi. We will presume that the work is being done in the evening. If in the daytime, do not have too much daylight in the room. Close the shutters and light the gas as if it were evening When making the exposure do not turn down the gas, but leave it lighted

No. 5

Surroundings medium to dark, No. 3 Flash Sheet, 7 feet distant. Stop No. 4. Face turned toward H. Light at K.

No. 6.

Spreader Flash Cartridge, 6 feet distant. Stop No. 8. Face turned toward F. Light at K.

and burning brightly. Plenty of gaslight in the room will do no harm and will prevent the eyes from having that stare so often seen in flashlight pictures. The color and size of the room is an important factor in the result, and I would much prefer a medium size room like the ordinary sitting room or dining room and one with light colored walls and ceilings. This will give an all around diffusion of the light which will help greatly in softening the effect.

The first thing to be considered is the size of the flash sheet to be used and the placing of the light. Regarding the size of the sheet we must con-

No. 7.

Spreader Flash Cartridge, 8 feet distant. Stop No. 16. Faces turned toward H and D. Light at J.

sider the color of the subject, the color of the room and the distance of the light from the subject. For example, if our subject is quite fair, with light hair and white dress, and the room is of the color and size before mentioned, a No. 1 sheet would be sufficient, placed at about six feet distance. For medium complexion use No. 2 sheet, and for very dark, a No. 3, or put the No. 2 sheet a little closer. A greater distance of the flash from the subject tends to make a softer lighting and a lesser distance a bolder and stronger ; but about six feet I would consider an average distance. If it is desired to place the light eight feet away, a larger sheet must be used—say a No 3 instead of a No. 2, and if it is placed closer than six feet, a smaller sheet will be better.

No. 8.

Spreader Flash Cartridge, 6 feet distant. Stop No. 16. Face turned toward H. Light at K.

The light can be placed anywhere except within immediate range of the lens. Diagram A, page 63, illustrates where it can be placed, but where it is to be placed for each subject will depend upon the wish of the operator, taking into consideration the features of the subject and the style of lighting desired. There seems to be a general idea among amateurs that the light should never be placed anywhere except behind the camera, as it might cause a reflection in the lens; but I place my light anywhere, except in the picture, and have never had any trouble from reflections of this kind. Another mistake I have noticed among amateurs is that they do not place the light high enough. If the light is six feet distant from the subject, it should be about three feet higher than the head of the sitter so as to give roundness and modeling to the face. Of course, this is subject to exceptions, as in the case of a subject with deep set eyes and heavy eyebrows, or of a lady with a large hat where it is not desired that the hat should throw a shadow on the face. In such case the light should be accordingly lower.

No. 9.

Spreader Flash Cartridge, 8 feet distant. Stop No. 4. Soft sketchy effect secured by setting focus of Kodak at 2½ feet. Subject being seated 3 feet from lens. Face turned toward H. Light at K

The illustrations presented herewith give an idea of the wide variety of lightings that may be made. Each of them is lettered with direct reference to Diagram A, and a careful study of the pictures in connection with the diagram is well worth while. In making portraits by the light

No. 10.

Spreader Flash Cartridge, 8 feet distant. Stop No. 4. Face turned toward L. Light at I.

from a window, the photographer cannot control his source of light to any extent. He may move only his camera and his sitter—by the flashlight method he has all conditions under perfect control—an especial advantage where one wishes to photograph the subject with some particular surroundings which happen to be in a part of the room where the window light is unsatisfactory, as in illustrations Nos. 2, 3 and 4

Important helps toward making good portraits with the flash are a reflector and a screen. It is perfectly evident that unless some steps are taken to equalize the lighting on the two sides of the face the contrast will be too violent and the "chalk and soot" effects that are so undesirable will be likely to result. The use of a reflector to soften the contrast is perfectly simple. For a bust portrait where the subject is sitting down, a white towel thrown over the back of a high backed chair will answer admirably, the reflector must not be too low, however, as the reflected light coming up from below will have a tendency to "flatten" the shady side of the face. The reflector should also be kept somewhat forward of the sitter. Another excellent method of using the reflector, and one that is really necessary with standing figures in order to get it high enough, is to pin a small sheet or any light colored material over a drawing string of tape, that can be fastened across any part of the room with a couple of thumb tacks or Kodak Push Pins, so that it will occupy the desired position.

No. 11.

Spreader Flash Cartridge, 6 feet distant. Stop No. 16. Face turned toward camera. Light at J.

The screen (or perhaps it should be called the light "filter") can be similarly arranged on another tape. This filter should be of cheesecloth, as nearly white as you can get it, and should be at least a yard square. Another method of using the filter is to tack it on a frame about a yard square and hold it in the left hand while the flash is lighted with the right

No. 12.

Spreader Flash Cartridge, 6 feet distant. Stop No. 8. Lady's face turned toward C. Child's face turned toward F. Light at B.

—this latter method can hardly be used, however, where the 8 foot stick suggested in the foregoing pages is employed as a flash machine.

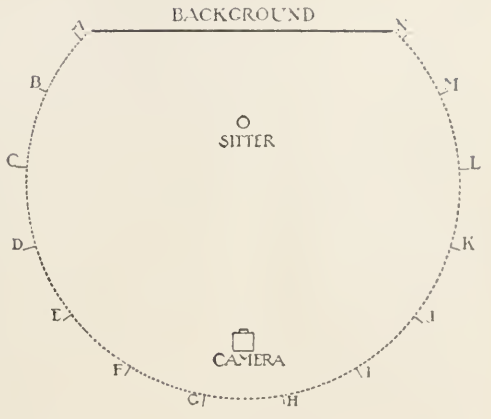


DIAGRAM A.

Diagram B shows one of the very many ways in which the tape method may be employed for fastening screen and reflector. Many houses have folding doors between the rooms, with portieres which may be used as a back-ground, attaching one end of the reflector and screen strings to each end of the curtain pole, while the other ends are tied to the chandelier which is generally in the middle of the room. Of course every room has a number of window and door casings in the side of which a pin or tack may be driven without harm, and these offer every opportunity for making a variation of the arrangement shown in Diagram B, thereby obtaining the precise lighting that may be desired.

Everything is now ready for the exposure. For a beginning, suppose we have the subject sit with his body facing "F" (Diagram A) and his face turned toward the camera. The light we will place at "K" about six feet distant and three feet higher than the head. This will make a lighting like illustration No. 6. If you are using a flash sheet it is well to use a candle, or, better still, one of those gas lighters having a wax taper in the end of a holder. Now, open the shutter and quietly light the sheet; as soon as the sheet is burned, close the shutter. There need be no hurry whatever, as the gas light is too yellow to make an impression on the plate in this short space of time even if a minute or two should elapse between the opening and closing of shutter, especially if the lens is stopped down to No. 8 or No. 16, which are about the openings for general use.

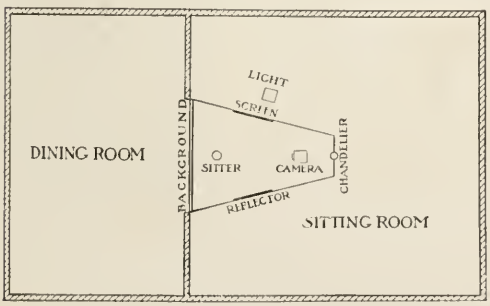


DIAGRAM B.

Development of flashlight exposures is exactly the same as daylight. If you think your exposure has been a

little below the normal, dilute the developer considerably, giving the shadows time to come up before the high lights get too dense; or if the light has been on the side of over-exposure, add a few drops of ten per cent. solution of Bromide of Potassium to hold back the shadows and give the negative the desired contrast. If the Kodak Machine is used, develop for six minutes in the solution at a temperature of 60 to 65 degrees.

The following summary of conditions necessary for making good portraits may be found useful for the serious worker, as each one of these conditions must be given its proper consideration to make a successful result.

1. GOOD LIGHTING.

a. Position of the light.
b. Diffusion of light by screen.
c. Distance of light from subject.
d. Placing of reflector.

2. CORRECT EXPOSURE.

a. Size of flash.
b. Color and size of room.
c. Color of subject.
d. Distance of light from subject.

3. PROPER DEVELOPMENT.

a. A good developing formula.
b. Dilution of developer.
c. Length of time of development.

NOTE. The pictures illustrating this article were made on N. C. Film with a Kodak. Nos. 1 to 5 inclusive, were made with Eastman's Flash Sheets and Nos. 6 to 12 with Eastman's Spreader Flash Cartridges.

Interiors by Flashlight.

The foregoing article by Mr. Ritch thoroughly covers the ground of Flashlight Portraiture but we wish to follow it up with a few remarks upon flashlight work in a general way. Aside from the making of portraits there are many uses for the flash.

Frequently it is desired to take a photograph of an interior which, by reason of a lack of illumination, or because some window, which cannot be covered, comes within range of the camera, is impracticable by daylight. In such cases a flash light solves the problem. Again, it is desired to photograph a very large room which is lighted from only one side by daylight. To get a full time exposure in the darkest corner of the room would cause a decided over-exposure near the windows. A flash light, concealed from direct line with the lens by some article of furniture or by a screen, illuminates the dark corner and gives a properly lighted exposure of the entire room.

These are the ordinary uses of the flash light, and by following the simple rules laid down, the amateur can make pictures with as great an assurance of success as when making snap-shots out of doors. For the production of unusual effects, however, one must study all the conditions, weighing carefully cause and effect, and must not yield to disappointment if success be not obtained at first.

There are many ways in which the flash may be made to co-operate with other artificial light, or with daylight, to produce a unique or artistic effect, and to the serious worker it offers another means to the end most desired by all photographic workers, pictorial effect.

FLASH SHEETS.

The Eastman Flash Sheets provide a simple and effective method of producing the flash. Being of great actinic power they impress the image upon the sensitive surface of film or plate quickly, although the flash is less blinding than that of ordinary powders.

The fact that flash sheets burn slowly as compared with flash powder makes them far safer to use—the danger from explosion by careless handling being reduced to a minimum.

DIRECTIONS FOR USING FLASH SHEETS.

Pin a flash sheet by one corner to a piece of cardboard which has previously been fixed in a perpendicular position. If the cardboard is white it will act as a reflector and increase the strength of the picture. All being in readiness, open the camera shutter, stand at arm's length and touch a match to the lower corner of the flash sheet.

Close the camera shutter.

When two or more sheets are to be used they should be pinned to the cardboard, one above the other, the corners slightly overlapping.

As a matter of precaution, place a piece of cardboard beneath as well as one behind the flash sheet, so that in case a spark should fall it will do no injury.

ARRANGEMENT OF THE LIGHT.

The light should be placed two feet behind and two to three feet to one side of the camera. If placed in front of, or on a line with the front of camera, the flash would strike the lens and blur the picture. It should be placed at one side as well as behind, so as to throw a shadow and give a little relief in lighting. The flash should be at the same height or a little higher than the camera.

TAKING THE PICTURE.

Having the camera and flash sheets in position, set the camera shutter open, as for a time exposure, but using the stop ordinarily used for snapshots.

Touch a match to the lower corner of the flash sheet. A bright flash will follow, which will impress the picture on the sensitive film. The shutter should be closed quickly after the flash. Otherwise, unless the room is in total darkness, objects or lights would begin to impress themselves on the film even without the flash.

STRENGTH OF THE FLASH.

The number of flash sheets required to light a room varies with the distance of the object farthest from the camera, and the color of the walls and hangings. The larger the room, of course the greater will be the strength of the flash required to cover it. With the flash sheets, the strength of light can easily be controlled. Simply use as many of the sheets, pinned together in the manner above described, as are necessary. The following table will be found useful :

TABLE.

For	10	feet	distance	and	light	walls	and	hangings	use 1 Sheet.
"	10	"	"	"	dark	"	"	"	" 2 Sheets.
"	15	"	"	"	light	"	"	"	" 2 "
"	15	"	"	"	dark	"	"	"	" 3 "
"	25	"	"	"	light	"	"	"	" 3 "
"	25	"	"	"	dark	"	"	"	" 4 "

The above table is for No. 1 Sheets. A smaller number of the larger sheets may be used if preferred.

GROUPS.

Arrange the chairs in the form of a semi-circle, facing the camera, so that each chair will be exactly the same distance from the camera. Half the persons composing the group should be seated and the rest should stand behind the chairs. In case any of the subjects are seated on the floor the limbs should be drawn up close to the body, not extended towards the camera. If this is not done the feet will appear abnormally large in the picture.

It is better to leave the room lighted in the regular way while making the flash. Arrange the persons composing the group so that no one's face will be shadowed by another's body or head. This can be done readily by looking at the group from where the flash is to be fired.

Have the flash light high enough so that shadows of heads against the background will not be thrown up higher than the head.

TAKING LARGE GROUPS.

In taking large groups it is necessary to have the camera a considerable distance away. In such a case, to light the group sufficiently with the flash behind the camera, it would be necessary to burn a number of sheets.

This may be obviated in cases where the camera can be placed in an adjoining room, where there are double parlors, for instance. Then set off the flash in the room where the group is, it being shielded from the lens by the projecting partition. This gets the light close to the subject. In this way one sheet will answer where three or four might have to be used otherwise.

BACKGROUND.

In making single portraits or groups, care should be taken to have a suitable background against which the figures will show in relief. A light background is better than a dark one, and often a single figure or two will

show up well against a lace curtain. For larger groups a medium light wall will be suitable.

The *finder* on the camera will help the operator to compose the group so as to get the best effect. In order to make the image visible in the finder, the room must be well lighted with ordinary lamplight, which may be left on while the picture is being made, provided none of the lights are so placed that they show in the finder.

IN GENERAL.

In portrait work it is always best to have the room well lighted when making the flash, if it can be done in such a way that none of the lights come within the range of the lens. If the room is darkened the sudden flash of the light so strains the eyes of the sitters that it almost invariably gives them a staring look, whereas if the room is already well illuminated by gas or lamp-light the strain is not great and the eyes will have a natural expression. Of course when the room is brightly lighted the shutter should not be opened until the instant before the flash is made, and should be closed quickly after the flash is over.

In making portraits by flash light, the camera should not be held in the hand, but should be supported as described on page 19. Before setting off the flash see that no articles of furniture in range of the lens are closer to the camera than the persons to be photographed. The nearer an object is to the lens, of course, the larger the picture. A chair placed too near the camera might appear in the picture bigger than everything else visible.

Flash light work is usually regarded as of minor importance compared with daytime photography, which may be explained by the fact that most people have not made themselves familiar with it. As a matter of fact it well repays considerable time and study, in view of the results that are possible. Some photographers now are using the flash light extensively in their regular portrait work.

When more than one flash light is to be taken, the windows should be opened and time allowed between each flash to free the room thoroughly from smoke, otherwise all of the pictures after the first one are liable to have a "foggy" effect. The Eastman Flash Sheets give a minimum of smoke, but the lens is even keener than the eye, and what will seem to be but little smoke in a room will oftentimes have a decided effect upon the picture.

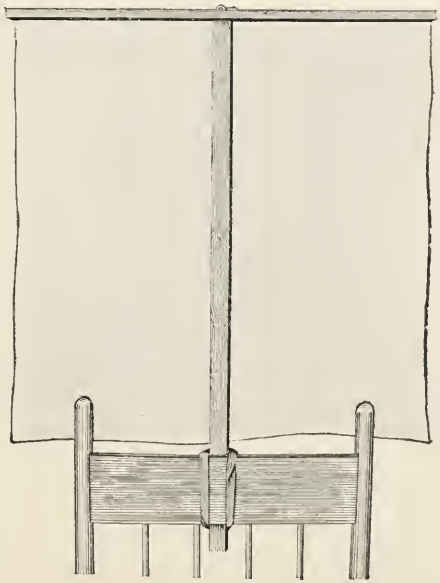
When, for any reason, it is necessary that the shutter remain closed until the instant the flash is discharged and be closed again instantly afterward, it is well to have the flash sheet hanging near so that the shutter can be operated with one hand and the flash with the other and their action thus made simultaneous.

NOT INSTANTANEOUS.

In using the flash sheets it should be borne in mind that they are not instantaneous, and in portrait work the subjects should, therefore, be warned to remain still as if for a time exposure.

The flash sheets do not produce a sudden flash when they are lighted, and a second or so is consumed in burning a single sheet. As compared with the ordinary flash powder they give a much broader source of light, which means that they do away with the harsh shadows that are so objectionable in most flashlight work. The flash from the sheets is far less blinding than that from the ordinary powder, a decided advantage in giving pictures without the staring effect to the eyes so often seen.

THE REFLECTOR.



The Reflector.

In the various articles upon Portraiture is explained the use of the reflector. In practice it is often inconvenient or undesirable to secure an assistant for the purpose of holding the cloth to be used as a reflector. Fig. 1 shows a reflector which may easily be constructed and which will be found very convenient in use. Provide two pieces of wood about one inch wide by one-half an inch thick, one piece being about two feet and the other two feet six inches long. In one end of the longer piece insert a screw eye having a head about one half an inch in diameter. Cut an opening in the center of the second strip so that the head of the screw eye will fit it snugly. A small flat hook fastened to the strip completes the joint. Procure a piece of white cotton cloth about two feet

square and fasten it to the edge of the short strip with small tacks. A large elastic rubber band completes the apparatus.

For use fasten the two strips together by the joint and fasten the screen by the aid of the rubber band to the back of an ordinary chair. The cloth will then hang straight down and by moving the chair about and changing the height of the screen by sliding the upright piece up or down the reflector may readily be placed in any desired position.

FOCUSING SCALE.

FOR CLOSE WORK.

The Cartridge Kodaks may be fitted with scale for close work without the portrait attachment, as follows:

Procure a piece of ground glass that will reach across the back of the Kodak from roller to roller. Hold the glass in place with rubber bands placed around the Kodak and the glass. Now focus with care upon some object that is exactly at those different distances from the lens at which you may desire to work and mark the place exactly under the pointer in each case, so that if the pointer is again placed upon that mark, the worker will know that an object that distance away will be sharply focused. A piece of lace pinned across the window makes a good object to focus upon and no focusing cloth will be needed.

With the additional scale which you have made for your Kodak you can then place the instrument as near the subject as you wish. A tape measure is very desirable when measuring distance from lens to face of subject, as exactness is of importance in close range work. A desirable scale for this extension is 3, 3½, 4, 4½, 5 and 5½ feet, and the intermediate distances if desired as 3¼ feet, etc.

NOTE—The new models of the No. 5 Cartridge Kodaks are now fitted with an extra long focusing scale adapting them to close work.

KODAK PORTRAIT ATTACHMENTS.

In order to give greater scope to the fixed focus Kodaks so that large bust portraits may be made with them we have devised our Portrait Attachment. This is a simple little device consisting of an extra lens so mounted that it may be instantly attached in front of the regular lens, and enabling the Kodaker to make sharp pictures with the fixed focus Kodaks at a distance of only three and one-half feet from the subject. With the 3½ x 3½ size this gives a head about the size that heads are usually made to occupy in an ordinary mantello photograph. The accompanying half-tone illustration is reproduced in the exact size, from a negative made with a Folding Pocket Kodak and Kodak Portrait Attachment.

BY RUDOLPH EICKEMEYER, JR.

FOLDING POCKET KODAK AND PORTRAIT ATTACHMENT.

This Portrait Attachment is for use at a distance of 3½ feet from the subject only with the fixed focus Kodaks, and its effect is to simply make the lens "cut sharp" pictures at this distance. It is to be used for bust portraiture only.

Portrait Attachments are also made for the larger Kodaks which are fitted with focusing scale. With these instruments different sized heads or busts may be obtained by altering the focus and distance from the subject.

Development.

Film photography offers three methods of development. They are:
The Kodak Developing Machine Method.
The Kodak Tank Developer Method.
The Dark Room Method.

The machine and tank methods are comparatively new yet they have now proven their efficiency and have fully demonstrated that they are not only more convenient than the old method but that they give a larger percentage of perfect negatives.

When, in the summer of 1902, the Kodak Developing Machine was first placed upon the market it was freely criticised but after it had been a few months in operation its marked success became apparent and the photographic writers began to discover that it was correct in theory as well as in practice. The Kodak Tank Developer works upon a similar principle so far as the winding up of the film inside a light proof flexible apron is concerned but in the machine the film is kept constantly in motion during development while in the tank it is simply reversed a couple of times to prevent streaks.

The result is that machine development is a trifle more rapid than tank development but the latter means less work for the operator. The final results are practically identical. With both the Machine and the Kodak Tank methods the dark-room is entirely eliminated.

The Dark Room method of film development is simple. So far as the operations go it is as successful with film as with plates especially since the advent of the Eastman Non Curling film yet aside from the mere question of convenience the Machine and Tank methods are preferable because, as has been proven, better results can be obtained by developing for a fixed time, in a fixed developer, than can be obtained under the old system of watching for the proper contrast and detail under the rays of the deceitful dark-room lamp.

The first question regarding machine development which will come to the mind of the skeptical photographer will assuredly be ; "When there are several unequal exposures on the same strip of film, how are all to be correctly developed, there being no opportunity for individual treatment?"

The manufacturers, before experimenting, felt that the machine might fail under these conditions, but the practical results show that within any reasonable limits it does not. The remarkable "latitude" which Kodak film allows in exposure, combined with the peculiarly active properties of the Kodak developer powders and the entire absence of fog (ordinarily caused by the dark-room lamp) upset all theories.

If the film is properly exposed the machine will develop it properly. If it is not properly exposed it will never make a good negative, no matter how much it be manipulated.

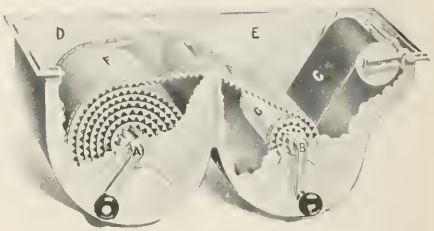
Time and temperature are the two factors of importance that must be taken into consideration. With the temperature of the developer at a specified point, development is to be continued for a certain length of time. When the developer is warm (it must never be above 70 degrees Fahr.) it acts rapidly; if very cold it acts slowly. It can be readily understood, therefore, that the operator must always have a knowledge of the temperature of his developer and time development accordingly, if he expects to obtain the best results.

As improvements calling for slight changes in the methods of manipulation are frequently made in all Kodak apparatus the operator of a Kodak Developing Machine or Kodak Tank Developer should read carefully the manual accompanying the particular machine that he purchases.

WITH THE KODAK DEVELOPING MACHINE.

After removal from the Kodak, the cartridge must be specially prepared by sticking the loose end of film to the black paper, which operation can be accomplished readily in the following manner:

Unroll the black paper carefully (holding spool with the *unprinted* side of the black paper up) until you uncover the piece of gummed paper which is fastened to end of film and is used as a means of fastening film to black paper. Moisten the gummed side of sticker evenly for about an inch across the end and stick it down to black paper, rubbing thoroughly to secure perfect adhesion. Wind end of black paper on spool again and insert in the spool carrier in end of Machine so that the black paper will lead from the top as shown in cut, the transparent apron (F-F) having first been wound onto Arbor "A." The gummed sticker which holds down the end of black paper is then broken, the paper pulled out and the end attached to Arbor "B" by slipping under the wire guard. Arbor "B" is now turned to the right until the word "stop" appears on top of cartridge. The end of Apron (F-F) is hooked onto Arbor "B"; the previously prepared (See page 75) developer is poured into compartment "E," and the top put on machine. The operator now turns handle to the right slowly and evenly until the time of development, six minutes has expired. The film (C) winds up inside of apron but with the face not touching it, thus allowing free action of the developer. As the handle turns freely and easily, the operation is not at all wearisome.



KODAK DEVELOPING MACHINE.

The cover is then removed from the machine; the developer poured off. Development completed, the film is thoroughly rinsed in cold water by filling machine until apron is covered, giving half a dozen turns to handle and then repeating the operation with one change of water. A tray or dish of Acid Fixing Solution having been previously prepared, the film is now removed from machine and the black paper detached after which it is transferred to the tray in the light of an ordinary room. (A light that would be safe for handling Solio in will be safe for this operation.)

FIXING BATH.

Use the Kodak Acid Fixing Bath or prepare an acid fixing bath in accordance with formula given on page 76.

Have plenty of fixing solution in a deep tray or earthen dish, so as to fully cover film, using four ounces of Fixing Powder to each pint of water. Fix for two or three minutes after all of the "milky" look has disappeared from negatives.

It sometimes happens that black paper adheres to the back of film when it is removed from the machine. This will readily come off while the film is soaking in the acid hypo bath. If it does not free itself, rub gently with the ball of finger *while the film is immersed.* This adhering of the black paper to the film is almost invariably caused by the use of a too warm developer.

If you use plain Hypo with N. C. Film, follow fixing by soaking for five minutes in a saturated solution of common alum to remove stains. If Kodak Acid Fixing Powder is used this is unnecessary. Wash and dry as per directions on page 76.

Nothing now remains to be done except to wash the film, to free it from Hypo (fixing solution); wipe it with a soft cloth and pin it up to dry. As soon as dry the negatives are cut apart and are ready for the print making to begin.

DEVELOPER POWDERS.

The best results are obtainable by the use of the Kodak Developing Machine Powders (put up expressly for machines of each size) and the Kodak Acid Fixing Powders but if preferred the operator may prepare his own solutions, bearing in mind, however, that his results depend upon the use of pure chemicals and upon absolute accuracy.

FORMULA FOR USE WITH KODAK DEVELOPING MACHINE.

DEVELOPER.

BROWNIE MACHINE.

10 grains Pyro.
30 grains Sulphite of Soda, anhydrous.
20 grains Carbonate of Soda, anhydrous.
8 ounces Water. Temperature, 65 degrees Fahr.

STYLE A MACHINE.

22 grains Pyro.
66 grains Sulphite of Soda, anhydrous.
44 grains Carbonate of Soda, anhydrous.
16 ounces Water. Temperature, 65 degrees Fahr.

STYLE E MACHINE.

30 grains Pyro.
90 grains Sulphite of Soda, anhydrous.
60 grains Carbonate of Soda, anhydrous.
24 ounces Water. Temperature, 65 degrees Fahr.

STYLE H MACHINE.

50 grains Pyro.
150 grains Sulphite of Soda, anhydrous.
100 grains Carbonate of Soda, anhydrous.
40 ounces Water. Temperature, 65 degrees Fahr.

ACID FIXING BATH.

The Acid Fixing Bath may be prepared as follows if desired:

Water, - - - - - - - -	16 ozs.
Hyposulphite of Soda, - - - -	4 ozs.
Sulphite of Soda (anhydrous) - -	80 grains.

when *fully dissolved*, add the following hardener:

Powdered Alum, - - - - - - -	½ oz.
Citric Acid, - - - - - - - -	⅛ oz.

This bath may be made up at any time in advance and be used so long as it retains its strength, or is not sufficiently discolored by developer carried into it as to stain the negatives.

WASHING AND DRYING.

The methods of washing and drying remain the same no matter what the methods of developing and fixing.

WASHING.

The film may be placed in a wash bowl of cold water and left to soak for five minutes each in five changes of cold water, moving it about occasionally to insure this water acting evenly upon it, or it may be given say two changes as above and then left for an hour in a wash bowl or tray with a very gentle stream of water running in and out.

DRYING.

When thoroughly washed, remove the surplus water from negatives with a squeegee or soft, damp cloth. Another easy method, when negatives are developed in the strip, is to draw the strip first one side up and then the other across the smooth edge of either a porcelain or enameled bath tub, or, for that matter, across any smooth, rounding surface, such as

Drying with Clips.

the edge of a china wash bowl. Be sure to remove *all surplus moisture* and "tear drops" before hanging up to dry.

Having removed the surplus water, snap an Eastman Film Developing Clip on each end of the strip and hang it up to dry, being sure it swings clear of the wall so that there will be no possibility of either side of the film coming in contact with the latter. In drying, N. C. Film should be cut up into strips of *not more* than six exposures in length.

If the film has been cut up, pin by one corner to the edge of a shelf or hang the negatives on a stretched string by means of a bent pin, running the pin through the corner of film to the head, then hooking it over the string.

Always keep finished negatives flat—*do not roll them up.* An Eastman Indexed Negative Album keeps them in perfect order.

WARNING.

Do not let either surface of N. C Film come in contact with anything while drying.

Never fix N. C. Film in the machine, it is likely to cause stains— and daylight tray fixing is easier.

Use an Acid Fixing Bath.

If the black paper sticks to back of film and does not come off in the bath, rub gently with the ball of finger while the film is immersed.

WITH THE KODAK TANK DEVELOPER.

The Kodak Tank Developer consists of a wooden box, a light-proof apron, a "transferring reel" and a metal "solution cup" in which the film is developed, and a hooked rod for removing film from solution. There is also a dummy film cartridge with which one should experiment before using an exposed cartridge. The various parts of the outfit come packed in the box itself.

SETTING UP THE TANK DEVELOPER.

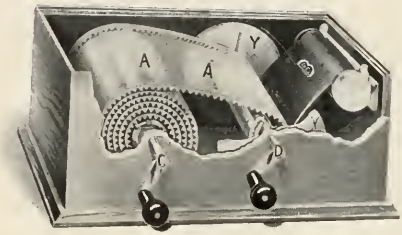


FIG. 1.

Take everything out of the box. Take red apron and transferring reel out of solution cup.

Insert the axles marked C and D in the cut, in the holes in the front of box. The front will be toward you when the spool carrier in end of box is at your right.

The axle "D" must be pushed through the hollow rod of the transferring reel and axle "C" through the smaller apron carrier to hold same in position.

The flanges at each end of the Transferring Reel are marked "Y" in the illustration.

Attach one end of the apron to "C" by means of the metal hooks which are to be engaged with the lugs on the axle (Fig. 2). The corrugated side of the rubber bands are to be beneath the apron when it is attached. Turn to left on axle "C" and wind entire apron on to axle, maintaining a slight tension on apron in so doing by resting one hand on it.

FIG. 2.

Insert film cartridge in spool carrier (Fig. 3), close up the movable arm tight against end of spool. Have the black paper ("B" in Fig. 1) lead from the top.

IMPORTANT.

Film to be used in the Kodak Tank Developer must be fastened to the black paper at both ends as described for Film to be developed in the Kodak Developing Machine. See page 74.

FIG. 3.

Break the sticker that holds down the end of black paper, thread the paper underneath wire guard on axle "D" (Fig. 4) and turn slowly to right until the word "stop" appears on black paper.

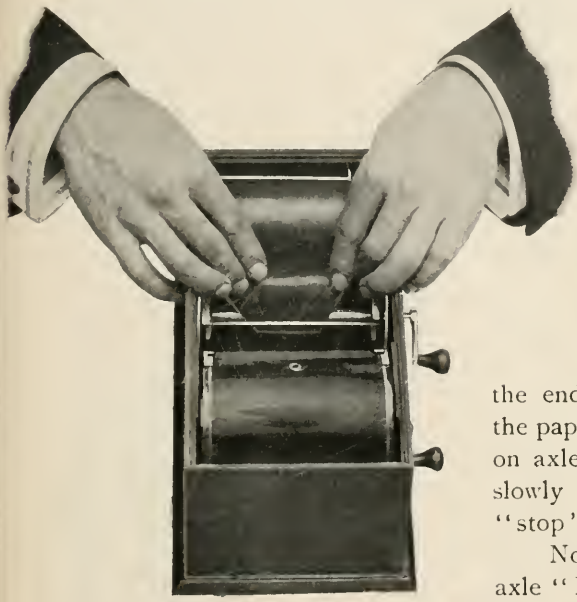


FIG. 4.

Now hook apron to lugs on axle "D" in precisely the same manner that you hooked the opposite end to axle "C" except that axle "D" turns to the right (Fig. 5).

FIG. 5

Turn handle half a revolution so that apron becomes firmly attached and put on cover of box. Turn axle "D" slowly and steadily until black paper of cartridge, film and apron are rolled up together on axle "D". As soon as this is completed the handle will turn very freely.

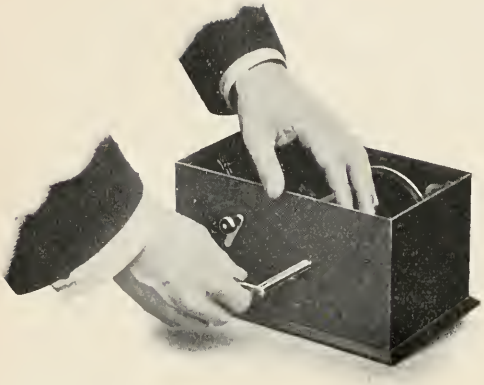


FIG. 6.

The developer should now be prepared and placed in the solution cup. See page 81.

Now remove cover from box and draw out axle "D," (Fig. 6), holding apron and black paper with other hand to keep end of apron from loosening.

Remove entire transferring reel (which now contains apron and black paper) which is freed by pulling out axle D, and insert immediately in the previously prepared developer.

USING THE SOLUTION CUP.

Having filled the solution cup as directed lower Transferring Reel into cup, either end first (Fig. 7). Let reel slide down slowly. The operation of removing reel from box can be done in the light of an ordinary room but, of course, for safety it is well that the light should not be too bright. Place the box cover on solution cup and allow development to proceed for 20 minutes.

FIG. 7.

The developer reaches all parts of the film immediately.

After 2 minutes turn the transferring reel in the cup end for end, and after 15 minutes again reverse it. The wire lifting rod is to be used for lifting the reel out of the cup. Hook on to the cross bar in one end of reel (Fig. 8).

FIG. 8.

When the end of reel containing cross bar is at the bottom of cup, the lifting rod is just long enough to catch the cross bar.

The fixing solution should be prepared while the film is developing.

When development is completed pour out developer and fill cup with clear, cold water and pour off, repeating this operation three times to wash the film. Then remove reel, separate film from black paper and place immediately in the previously prepared Fixing Bath.

The operations of fixing, washing and drying are precisely the same as with machine developed negatives. See pages 76 and 77.

PREPARING THE DEVELOPING SOLUTION WITH KODAK TANK DEVELOPER POWDERS.

Pour three or four ounces of lukewarm water into the Solution Cup. Open the package of powder and pour in the Sodas (contained in the larger package). Stir until dissolved. Now fill cup to ring with cold water. Empty the contents of second package (Pyro) into the solution. Stir for a few seconds or until dissolved. Developer must always be prepared fresh for immediate use. Temperature 60° to 65° Fahr.

SHORT DEVELOPMENT.

The length of development may be cut to ten minutes by the use of two powders. Of course in such case the operator will dissolve the sodas of both powders in the lukewarm water and will then fill the cup to ring with cold water and dissolve the two papers of pyro.

For ten minute Development the Film should be reversed at the end of one minute and at the end of seven minutes.

FORMULAE.

On account of their purity and the accuracy with which they are prepared the Kodak Tank Developer Powders are recommended but the operator may use the following if desired.

FOR TEN MINUTE DEVELOPMENT.

BROWNIE TANK.

20 grains Pyro.
60 grains Sulphite of Soda, anhydrous.
40 grains Carbonate of Soda, anhydrous.
12 ounces Water. Temperature, 65 degrees Fahr.

THREE AND ONE-HALF INCH TANK.

44 grains Pyro.
132 grains Sulphite of Soda, anhydrous.
88 grains Carbonate of Soda, anhydrous.
36 ounces Water. Temperature, 65 degrees Fahr.

FIVE INCH TANK.

60 grains Pyro.
180 grains Sulphite of Soda, anhydrous.
120 grains Carbonate of Soda, anhydrous.
48 ounces Water. Temperature, 65 degrees Fahr.

FOR TWENTY MINUTE DEVELOPMENT.

BROWNIE TANK.

10 grains Pyro.
30 grains Sulphite of Soda, anhydrous.
20 grains Carbonate of Soda, anhydrous.
12 ounces Water. Temperature, 65 degrees Fahr.

THREE AND ONE-HALF INCH TANK.

22 grains Pyro.
66 grains Sulphite of Soda, anhydrous.
44 grains Carbonate of Soda, anhydrous.
36 ounces Water. Temperature, 65 degrees Fahr.

FIVE INCH TANK.

30 grains Pyro.
90 grains Sulphite of Soda, anhydrous.
60 grains Carbonate of Soda, anhydrous.
48 ounces Water. Temperature, 65 degrees Fahr.

THE DARK-ROOM METHOD.

The first essential is a dark-room. By a dark-room is meant one that is wholly dark—not a ray of light in it. Such a room can easily be secured at night almost anywhere. The reason a dark-room is required is that the film is extremely sensitive to white light, either daylight or lamplight, *and would be spoiled if exposed to it* even for a fraction of a second.

If possible have running water, but if this is not available provide a pitcher of *cold* water (ice water in summer), a shelf or table on which to work and (for use with film) a pair of shears.

Also provide a Developing and Printing Outfit which should contain :

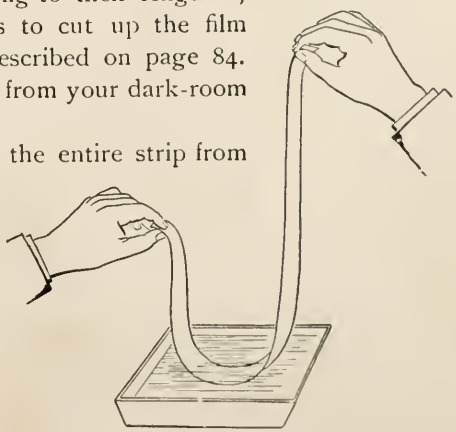
1 Dark-Room Lamp,
4 Developing Trays,
1 Glass Beaker,
1 Stirring Rod,
Package Developer Powders,
1 lb. Kodak Acid Fixing Powders,
1 Package Bromide Potassium,
1 Ounce Glycerine.

Such an outfit need not cost more than one or two dollars and will be sufficiently elaborate for your first work.

TO DEVELOP FILM.

Film, to avoid curling, must always be developed *face down*, otherwise it is handled in much the same manner as plates except, of course, that it must be cut up before printing.

For all Kodak cartridge rolls, shorter than 4 x 5, 12 exposure, we recommend that development be done in the strip, as this method removes the possibility of cutting through the negatives. The same method may be used with the larger sizes, but owing to their length is, perhaps, not quite so convenient as to cut up the film before development is started, as described on page 84. Having shut out all extraneous light from your dark-room and lighted the dark-room lamp.



a. Unroll the film and detach the entire strip from the black paper.

b. Pass the film through a tray of clean, cold water, as shown in the cut, holding one end in each hand. Pass through the water several times, that there may be no bubbles remaining on the film. When it is thoroughly wet, with

no air bubbles, place the strip of film in a tray of water, immersing it fully but not folding tightly so as to crack it.

c. Prepare the developer as described on page 85.

d. Now pass the film through the developer in the same manner as described for wetting it, and shown in cut. Keep it constantly in motion, and in about one minute the high lights will begin to darken and you will readily be able to distinguish the unexposed sections between the negatives, and in about two minutes will be able to distinguish objects in the picture. Complete development in the strip, giving sufficient length of development to bring out what detail you can in the thinnest negatives.

Keep the strip which is being developed constantly in motion, allowing the developer to act five to ten minutes. The progress of development may be watched by holding the negatives up to the lamp from time to time.

When developing Eastman's N. C. Film, care must be taken not to hold it close to the lamp for any length of time. These films are very rapid and are orthochromatic, therefore liable to fog unless handled very carefully in the dark-room or developed in the Kodak Developing Machine or Tank.

e. After completing development, cut the negatives apart with a pair of shears, transfer to the third tray, and rinse two or three times with clear, *cold* water. Now proceed according to paragraph 6, page 85.

This method must always be followed with the Cartridge Roll Holder rolls, but they may first be cut in two at point where perforations occur in the middle of strip.

ANOTHER WAY.

1. Unroll the film and cut the exposures apart as shown in Fig. I.

In unrolling the film preparatory to development, care must be taken that the end be not allowed to roll up over the paper. The exposures should be cut apart with the PAPER ON TOP.

Fig. II shows a cartridge unrolled with the film on top. To correct this, simply turn back the film as indicated by the dotted lines, thus bringing the film under the paper.

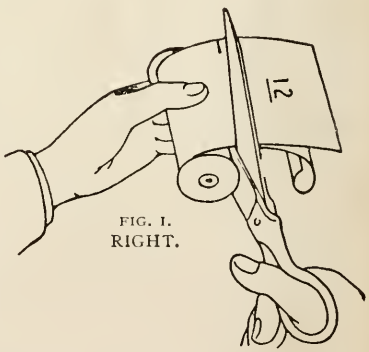


FIG. I.
RIGHT.

2. Fill one of the trays nearly full of water, and put into it the exposures, one by one, *face down;* put them in edgewise, to avoid air bells, and immerse them fully.

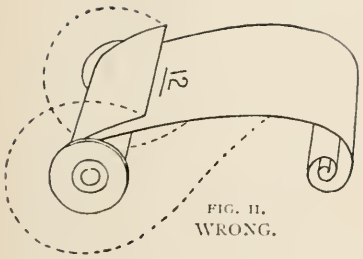
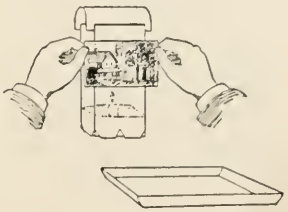


FIG. II.
WRONG.

Cover the tray with a bit of brown paper to keep out the light from the lamp.

3. Open one of the developer powders, then put the contents, (two chemicals) into the beaker and pour in four ounces of water. Stir until dissolved with the stirring rod, and pour into second tray.

4. Take one of the exposures from the water and immerse it, *face down*, in the second tray. Rock it back and forth to prevent streaks and air bubbles; in about one minute the film will begin to darken in spots, representing the lights of the picture, and in about two minutes the operator will be able to distinguish objects in the picture. The developer should be allowed to act five to ten minutes.



5. Transfer the developed film to the third tray, and rinse two or three times with water, leaving it to soak while the next film is being developed.

NOTE.—Five or six 4 x 5 negatives can be developed, one after the other, in one portion of developer, made by use of Eastman's Special Developer Powders, then it should be thrown away and a fresh portion mixed.

Only one negative should be developed at a time until the operator becomes expert.

As each successive negative is developed, it should be put, with the preceding negatives, in the washing tray, and the water changed twice, to prevent the developer remaining in the films from staining them.

6. Prepare in the fourth tray sufficient fixing bath to fully cover the negatives, use 1 ounce of Kodak Acid Fixing Powder to each 4 ounces of water.

7. Immerse the negatives one by one in the fixing bath until they are entirely clear of white spots and are transparent instead of milky by transmitted light. This will require about ten minutes.

8. The yellow shade can be removed from the lamp as soon as all the exposures have been fixed.

Wash and dry as per directions on page 76.

The fixing solution must only be used in tray No. 4, and the negatives, after fixing, must not be put in either No. 1 or No. 2 trays. Neither must any of the fixing solution be allowed to touch the films, through the agency of the fingers, or otherwise, until they are ready to go into the fixing bath, otherwise, they will be spotted or blackened, so as to be useless.

N. C. Films do not curl, consequently with them the glycerine solution is unnecessary.

The trays and beaker should now be rinsed out and set away to drain and dry.

A FEW REMARKS UPON DEVELOPMENT.

The foregoing pages fully cover the subject of development so far as telling the beginner exactly what to do is concerned. If the amateur follows absolutely the directions therein given he will secure good results; but a word of the theory of development will nevertheless prove interesting and instructive.

An exposed and unexposed film do not differ, so far as the eye can judge. It is necessary, therefore, to treat the exposed film with a solution containing certain chemicals to reveal the action of the sun's rays.

This is called development.

The chemicals are the developer.

The active or developing agent, such as Pyrogallic acid (commonly known as Pyro) and Hydrochinon, affect the latent image by reducing to metallic silver those parts which have been affected by the light. In other words, it blackens them. But these agents require the use of another substance to give them energy:

ACCELERATOR.

An alkali when mixed with the active developing agent gives it a greater affinity for oxygen; it therefore becomes more energetic as a reducer. This alkali is called an accelerator. The alkalies most commonly used are Carbonate of Soda (known as sal soda and washing soda) and Carbonate of Potassium.

RESTRAINER.

A restrainer is a substance that has the power to restrain or retard the action of development. Bromide of Potassium, most commonly used for that purpose, has the property of dissolving a certain amount of Bromide of Silver from the film, thereby forming a double salt which is less easily reduced by the developer. This action having taken place, the development is much slower; hence the name, "restrainer."

PRESERVATIVE.

The preservative is a substance that will keep the developer from discoloring and oxydizing when it is to be kept for future use. "Sulphite of Soda" is most commonly used for that purpose; it also has much to do with the color of the negative. If only a very small portion be used the negative will be brown, the quality being harsh and hard and one that will give you a print of much contrast, while the use of a greater portion gives a gray, soft negative with more detail.

FIXING THE NEGATIVE.

The fixing or clearing of a negative is due to the action of the "Hypo-sulphite of Soda" eating out the Bromide of Silver not acted upon by the light, and until this has been accomplished it is still sensitive. When the creamy appearance on the back of the negative disappears it may be called "fixed," and can then be taken from the bath and exposed to any light without fear of injury.

DEFECTIVE NEGATIVES.

Defective negatives may be caused by under or over exposure or by careless handling during development and subsequent operations.

Over or under-development is usually occasioned by the fact that the inexperienced operator is unable to tell, under the dark-room light, whether he has carried the development far enough or not and he is extremely likely to err on the side of under-development.

A properly exposed negative should be developed for five minutes. If you feel that you have under-exposed the negative no harm will come from developing up to eight minutes. The beginner will, as a rule, secure better results by timing development by the watch than he will by trying to judge the appearance of the negative.

FIG. 1.

Fig. 1 shows an under-exposed negative clear in the dark parts or shadows with an entire absence of detail, the high lights or white parts of the subject being black, also lacking in detail. This fault is caused by making snap shots indoors, or in the shade, or when the light is weak, late in the day, or by closing the lens too soon on time exposures.

Fig. 2 shows an over-exposed and over-developed negative, full of detail but flat, lacking all contrast and brilliancy and at the same time it looks black or dense.

Caused by too much light.

Negative develops evenly, shadows almost as fast as high lights.

No contrast, and no deep shadows.

If a negative is known to be over-exposed before development is begun, it can be largely overcome by the addition of bromide of potassium to the

developer, before development begins, and a bottle containing

Bromide of Potash, 1 oz.
Water, - - 10 ozs.

should always be at hand when you are developing.

Use 1 to 4 drops for each ounce of developer according to amount of over-exposure.

After the Bromide has been added to the developer, it should not be used for another negative unless it is known to have been over-exposed.

OVER-DEVELOPMENT.

Caused by leaving the negative too long in the developer.

Fig. 2.

Fig. 3.

In this case the negative is very strong and intense by transmitted light and requires a very long time to print. The remedy is to reduce by the following method :

REDUCER.

First soak negative 20 minutes in water, then immerse in :

Water, - - 6 ounces.
Hypo-sulphite Soda, ½ ounce.
Ferri Cyanide Potassium, 20 drops (saturated solution).

Rock tray gently back and forth until negative has been reduced to the desired density, then wash ten minutes in running water or in four changes of water.

FIG. 3 B.

Negatives may be reduced locally by applying the above solution to the dense parts with a camel's hair brush, rinsing off the reducer with clear water occasionally to prevent its running onto the parts of the negative that do not require reducing.

Fig. 3 shows a negative correctly timed and developed; note the brilliancy, depth, and well-defined detail compared with Nos. 1 and 2.

Fig. 3 B is a positive print from negative No. 3.

Fig. 4 shows negative under-developed, having plenty of detail but thin and with very slight contrast.

UNDER-DEVELOPMENT.

Caused by removal from the developer too soon.

An under-developed negative differs from an under-exposed one, in that it is apt to be thin and full of detail, instead of harsh and lacking in detail. If the development is carried on as before directed, this defect is not liable to occur.

If a mistake has been made in developing and the negative does not appear strong enough (this can be judged only by experience), the negative can be improved by

FIG. 4.

Intensification—Lay the film in one of the empty trays and pour over it sufficient Intensifier to fully cover it; allow it to act until the film is all of one even color and then pour the Intensifier back into the bottle and wash the film in four or five changes of water for fifteen minutes

Intensifier may be purchased already prepared or the amateur may put it up himself, using the following formula:

INTENSIFIER.

No. 1, 75 Gr. Bi-chloride of Mercury (corrosive sublimate) Poison, - - - - 5 oz. Water.
No. 2, 112 Gr. Iodide of Potassium, - 2½ " "
" 3, 150 " Hypo-sulphite of Soda - 2½ " "

Dissolve separately and combine No. 1 with No. 2 and the resulting mixture with No. 3.

LIGHT FOG.

This is caused by the light coming in contact with film other than that which comes through the lens during the proper exposure. Frequently it is caused by exposure to an unsafe light during development; also by light entering the dark-room through the key-hole or a crack in the door. Examine your dark-room thoroughly before developing and see that all white light is excluded. Fog is often caused by the negative being exposed to light after development but before fixing.*

Even the colored light from a dark-room lamp will fog film or plate if they are exposed to it too long. Do not work unnecessarily close to the lamp and until after negatives are thoroughly "fixed" keep trays in which they are lying covered with brown paper to exclude all light.

SPOTS, STREAKS, ETC.

Air bells on the film in the developer or fixing bath are liable to cause spots, and streaks are caused by allowing the film to remain uncovered in part by the various solutions while in them.

White, milky spots are evidence that the negative has not been properly fixed, and the negative should be put back into the fixing bath, and then rewashed.

Sometimes after the negative is dry you will find a deposit of small crystals on its surface. This is Hyposulphite of Soda and indicates insufficient washing.

*If developer is thoroughly washed out of film, short exposure to weak light will do no harm between development and fixing.

TEMPERATURE.

Keep your baths during use at a uniform temperature, about 65° Fahr. Much trouble is caused by the developer and fixing baths being too warm or too cold. When too warm the result is frequently a weak "mealy" negative. It may cause the film to fog (the casting of a haze or veil over the surface). The edges may frill or loosen from the support; should the temperature reach 85° the film would soften.

In hot, muggy weather keep the developer cool with a small piece of ice in the tray, or better still, set the developing tray in a tray of larger dimensions, filling the space between the sides and ends with chopped ice.

WHAT DEVELOPER TO USE.

It is well not to try too many developers at the beginning. To understand one thoroughly, or at the most two, will give you results from which you will obtain more satisfaction than should you dabble with the various formulas on the market to-day. Thoroughly master one before trying others. One may start with "Pyro" or "Hydrochinon," which are without doubt two of the best.

Pyro, the most popular, has a decided tendency to stain the fingers. Should this be objected to, Hydrochinon (which is free from that objection) can be used with good results. Not every photographic beginner owns a pair of chemist's scales, which are a necessity should he wish to compound the formula himself. Rather than be uncertain as to correctness, we would advise the use of developing powders. Eastman's Special Developer Powders are particularly desirable as they do not stain the fingers. If, however, the amateur desires to mix his own developer, the following stock solution used as below will be found an excellent developer for either the dark-room, the Machine or the Tank.

PYRO DEVELOPING FORMULA.

PYROGALLIC ACID SOLUTION.

"A."	AVOIRDUPOIS.	METRIC SYSTEM.
Pyrogallic Acid,	1 oz.	30 grams.
Sulphuric Acid,	20 minims.	1 c. c.
Water,	28 ozs.	900 c. c.

SODA SOLUTION.

"B,"	AVOIRDUPOIS.	METRIC SYSTEM.
*Carbonate Soda (Anhydrous),	2 ozs.	60 grams.
*Sulphite Soda (Anhydrous),	3 ozs.	90 grams.
Water,	28 ozs.	900 c. c.

*If crystals are used, double the quantity.

For dark-room development take

"A,"	½ oz. (15 c. c.)
"B,"	½ oz. (15 c. c.)
Water,	4 ozs. (120 c. c.)

This developer will then contain 1.56 grains Pyro per ounce.

For 6 minute development in Developing Machine or 10 minute development in Tank Developer use the following proportions :

"A,"	1 oz. (30 c. c.)
"B,"	1 oz. (30 c. c.)
Water,	10 ozs. (300 c. c.)

This developer will then contain 1.30 grains Pyro per ounce.

For 20 minute development in Tank Developer use the following proportions :

"A,"	1 oz. (30 c. c.)
"B,"	1 oz. (30 c. c.)
Water,	22 ozs. (660 c. c.)

This developer will then contain .65 grains Pyro per ounce.

DEVELOPING DRY PLATES.

The foregoing directions apply to dry plates as well as films, the chemical treatment being the same, except that the preliminary wetting may be omitted with plates.

Plates, however, must be handled in the solutions one at a time as they would scratch each other if a larger number were put into the trays simultaneously. They should also be developed *face up.*

Kodoid plates should be handled the same as N. C. Film. They may be developed a number at once in a tray as described on page 85. They must be fixed in an acid fixing bath and dried in the same way as N. C. Film.

PRINTING.

Having developed the negatives, the final step in picture making is now in order—making the prints. For printing there are many papers—grouped under two general classes, "printing out" papers, where the image is visible after printing and "developing out' papers which require a developing solution to make the image visible.

For the amateur there is no more satisfactory printing process than that offered by the use of Developing Papers, such as Velox, Dekko and Azo. Prints made by this process give a rich, soft Platinum effect not excelled by any other paper.

These papers can be printed by either artificial light or daylight, and like an exposure on film the image is not visible and it must therefore be developed.

The process is simple, but like all others it requires some skill and judgment, both of which can easily be acquired by strict adherence to the given rules and formula.

THE EXPOSURE.

Although development papers can be used with entire satisfaction during the day, they are often used in the evening by those who have no leisure time for that work during the day.

Artificial light is preferable to daylight for making the exposures. This lies in the fact that it does not vary in strength, and after you have obtained the proper distance from the light and the proper time for exposure it is not at all difficult to get all prints from the same negative of a uniform depth.

THE RELATIVE STRENGTH OF ARTIFICIAL LIGHTS.

Welsbach gaslight—strongest.

Incandescent light—about one-half as strong as Welsbach gaslight.

Ordinary gaslight—slightly weaker than incandescent light.

Oil lamp of ordinary size—about one-third as strong as an ordinary gas burner.

With a negative of medium density expose three to five minutes at a distance of from six to eight inches from an ordinary gas burner.

To insure perfect results and to prevent all possibility of fogging your paper, the place selected for working, *i. e.*, filling the print frame and developing, should be removed to a safe distance from the source of light. This can be determined by taking a small strip of the paper, covering one-half and exposing the remaining portion about thirty seconds to the light where you intend working. If upon development there is found any difference between the exposed and unexposed portions, the light is too strong and you should move farther away or shade your light.

When opening your package of paper, if uncertain as to which is the sensitive side, use that which is concave, as the paper curls slightly inward on the coated side.

When ready to make an exposure, take a sheet of paper and cut it into strips, say about one-half inch wide, now place one of the strips on the negative and make the exposure according to your judgment as to time and distance from the light. If not satisfactory try another strip, varying the time of exposure and distance from light according to your first exposure. When the best results are secured in this way you can then proceed to make any number of prints from the same negative, and if the time and distance are identical with those used in obtaining your best experimental result, the prints made should be equally good.

ABOUT VELOX.

Velox is a "developing-out" paper which can be printed at any time, by any kind of light, from any negative. The photographic image is not visible until the developing solution has been applied.

Velox is suitable for portraits, landscapes, interiors or for photographic work of every sort; is used in every branch of photography and avoids delay arising from dependence on sunlight for printing.

Velox permits the amateur to utilize his evening hours.

Velox is the only photographic paper in the manufacture of which the needs of the amateur photographer have principally been considered. Since its introduction many marked improvements have been made, all with a view to producing a paper that would leave nothing to be desired by the amateur. That the efforts of the manufacturer have been successful in this respect and that Velox is unquestionably superior to all other papers for amateur use, is proved by the fact that to-day the amateurs of the United States use more Velox than all other papers combined.

Velox should not be confused with other papers; it has distinctive qualities of its own, which have never been successfully imitated.

Velox is made in a number of different surfaces and two different grades. These enable the user to produce good prints from almost any negative, suiting his own individual taste and the peculiar requirements of his negatives.

RANGE OF VELOX.

Velox is divided broadly into two kinds of papers called "Regular" and "Special" (slow and fast), these terms having reference to the time required for exposure and development. In each division will be found a variety of surfaces which adapt the paper to all kinds of work and negatives of different qualities.

"Regular" papers develop quickly, suiting them to negatives that lack contrast.

"Special" papers require a long development as compared with the "Regular," and give soft effects from hard negatives. Any negative which will produce a good result with "printing-out" paper should be printed on "Special" Velox, while "Regular" Velox should be used only with very flat negatives.

A negative must be judged by its contrast, not by its being thick or thin.

PREPARATION OF THE BATHS.

For a developing solution we strongly recommend the use of Nepera Solution and for the fixing bath, Nepera Acid Hypo, or a hypo bath acidulated by the addition of Velox Liquid Hardener. These preparations as they are put up for use with Velox by the people who make Velox, exactly meet every requirement. They are certain of giving good results when properly handled.

DEVELOPER FOR SPECIAL VELOX.

Nepera Solution,	1 oz.
Water,	4 ozs.

DEVELOPER FOR REGULAR VELOX.

Nepera Solution,	2 ozs.
Water,	4 ozs.

With Glossy Velox substitute N. A. Velox Liquid Developer for Nepera Solution. It prevents abrasion marks.

FIXING BATH.

Nepera Acid Hypo,	1 box.
Water,	16 ozs.

Or, prepare Fixing Bath by dissolving four ounces Hypo in sixteen ounces of water, to which solution should be added one ounce of Velox Liquid Hardener.

(This is sufficient to fix one-half gross of 4 x 5 prints.)

If desired the photographer may make up his own developer according to the formula given below, but in such case should take care to get the purest chemicals and to compound them accurately.

Do not waste paper by using anything inferior in the way of chemicals or ready prepared developers put out by irresponsible and obscure manufacturers.

If it is desired to prepare one's own solutions, the following formulæ should be followed carefully:

DEVELOPER.

(Dissolve chemicals in the order named.)

	METRIC SYSTEM.
Water,	10 ozs. = 300 c. c.
Hydroquinone,	30 grains = 2 grammes.
Sulphite Soda (desiccated),	110 grains = 7 grammes.
Metol,	7 grains = ½ gramme.
Carbonate Soda (desiccated),	200 grains = 13 grammes.
10% solution Bromide Potassium,	40 drops = 40 drops.

This solution will keep indefinitely if placed in bottles filled to the neck and tightly corked. It should be used full strength for "Regular" Velox, but can be diluted with equal parts of water when "Special" papers are to be developed.

NEPERA SOLUTION.

Nepera Solution is a combination developer, giving most excellent results with Velox or Bromide paper, while in combination with a Nepera Capsule it is a superior developer for film or plates.

For Special Velox, Lantern Slide Plates and Bromide paper—one part Nepera Solution, four parts water. For Regular Velox one part Nepera Solution, two parts water.

When making prints remember that "the stronger the developer the softer the print" and that this stock solution *without dilution* will give the softest results.

Do not forget to dip prints in water after development.

Temperature of the bath should be between 65 and 70 degrees Fahr.

ACID FIXING BATH.

(Dissolve chemicals in the order named.)

	METRIC SYSTEM.
Water, - - - -	64 ozs.=2000 c. c.
Hyposulphite of Soda, - -	16 ozs.=500 grammes.

After the above bath has been made, add to it the following hardening solution.

	METRIC SYSTEM.
Water, - - - -	5 ozs.=150 c. c.
Sulphite Soda (desiccated), - -	¼ oz.=7 grammes.
Acetic Acid (containing 25% pure acid), -	3 ozs.=90 c. c.
Powdered Alum, - - -	½ oz.=14 grammes.

This solution if kept in a corked bottle can be used repeatedly and one pint of it will fix at least ½ gross of 4 x 5 prints.

If in making the developing or fixing solutions, sulphite and carbonate sodas in crystal form are substituted for desiccated, double the quantities mentioned should be used.

NOTE.—In England, Canada or wherever the British Pharmacopœia is official, use 150 grains of desiccated sodium carbonate, instead of 200.

VELOX PRINTER'S OUTFIT.

Although Velox can be used with entire satisfaction in day-time in a darkened room, it is so frequently used for evening work that we will proceed on the assumption that you wish to make your prints in the evening by artificial light. A general guide as to exposures by different kinds of light will be found further on. Aside from a suitable light the Velox Printer's Outfit should be as follows:

A quantity of *developer* and *fixing bath* made either according to the published formula or by mixing ready prepared chemicals as per directions. *Three trays*, in one of which the developer is placed, in another water and in the third the fixing bath. Running water, for washing prints after fixing, is desirable. A place for opening the paper and developing the prints should be selected, bearing in mind that in a room illuminated only by gas flame, or light of equivalent strength, these preparations can be carried on with safety at ten feet from the ordinary gas burner, if the sensitive sides of the sheets of the paper are not exposed to its direct rays. If the space is limited, a piece of cardboard can be hung near the light in such a way that the shadow will fall upon the developing tray and paper.

Having made these preliminary arrangements you are ready for exposure; the printing frame should be filled.* Place the sensitive side of the sheet of Velox against the film side of the negative, the paper curls slightly, the sensitive side being concave. An absolute test is to bite the corner of the sheet, the sensitive side will adhere to the teeth.

*See page 109.

TIME OF EXPOSURE AND DISTANCE FROM THE LIGHT.

Expose by placing the frame a few inches from the artificial light used, even exposure being insured by having the frame away from the burner a distance equal to the diagonal of the negative. While exposure by diffused daylight from a northern window will insure good results, with practice, *the use of artificial light is advised.* It is preferable to daylight because it varies less.

Place a box, or a support of some kind for the printing frame in front of the light in order to be able to repeat the same conditions as to light intensity.

To prove that the light is evenly diffused at a point selected for exposure, take a piece of white cardboard the size of the negative and move its position with reference to the light until you find the shortest distance at which an even illumination is secured.

A few seconds exposure will be required when printing an average negative on Special Velox. Regular Velox needs four or five times as much exposure as Special Velox, if in using both brands the printing frame is held at the same distance from the light. Exposures, with various artificial lights, at the distance advised when negatives of average density are to be printed, will be approximately as follows :

	Size of negative.	Distance from light.	Welsbach burner.	32 c. p. electric or 6 ft. gas burner.	16 c. p. electric or 4 ft. gas burner.	Average oil lamp
SPECIAL VELOX.	4 x 5 or smaller	7 inches.	10 sec.	20 sec.	30 sec.	40 sec.
REGULAR VELOX.	4 x 5 or smaller	7 inches.	40 sec.	80 sec.	2 min.	3 min.

After taking the exposed piece of paper from the printing frame, opening the frame in the safe place previously selected, you are ready for developing.

DEVELOPMENT.

Temperature of developer should be about 70 degrees Fahr.

The print should be immersed face up in the developer, and be quickly and evenly covered by the solution. "Regular" Velox should be developed about fifteen seconds, while "Velvet" or "Special" should be in the bath about twice as long. If the high lights of the prints are gray, add a few drops of 10% solution of Bromide of Potassium to the developer. Do not use more Bromide than is necessary to secure pure whites, as with an excess of restrainer the shadows will have a greenish tint. (A 10% solution will be secured by dissolving 1 oz. Bromide of Potassium crystals in 9 ozs. of water.)

To develop by the cotton or brush method, instead of the developing tray, provide yourself with a sheet of glass a little larger than the print to be developed, and pour the developer into a graduate or tumbler. Place the exposed print, face up, on the glass, thoroughly saturate the cotton or brush with the developing solution and apply to the surface of the print, going over the surface of the emulsion lightly and spreading the developer evenly and abundantly on all portions of the print. We think the brush method of developing is more difficult than "immersion", so recommend the latter. (Stains are likely to occur when developer is brushed onto the emulsion.)

As soon as the print is developed, being guided by the time of development mentioned above, *it should be dipped in water for a second*, to remove the greater part of the developer, then immediately transferred to the Acid Fixing Bath, where a thorough immersion should be secured, to prevent stains caused by uneven fixing.

FIXING.

Temperature can be as low as 50, but not higher than 70 degrees Fahr. Fifteen minutes, or longer should be the time of fixing. To secure thorough immersion of the prints in the fixing bath, a small paddle or glass funnel (using its stem as a handle) can be used, obviating the necessity of frequently washing the hands to avoid getting Hypo in the developer. A number of prints can be in the fixing bath at the same time if each one is moved about for a few seconds before it is allowed to sink to the bottom of the solution. *Many prints are spoiled by neglect of this precaution.* The prints can remain in the bath a longer time than 15 minutes except in very hot weather, when they may turn brown (in case the temperature of the fixing bath gradually rises).

WASHING.

Wash the prints for one hour in running water, or ten changes of water, each change being made by passing the prints, one at a time, from one tray to another, refilling each tray with fresh water after all of the prints have been removed from it. Imperfect washing will cause prints to change color after they have been made for a time, because the chemicals of the fixing solution have not been entirely removed.

DRYING.

After washing, the prints should be placed face down, on cheesecloth, or other absorbent fabric, so that they will not curl, taking care that they are not piled on one another.

MOUNTING.

Prints should be trimmed as desired and then thoroughly wet and laid, face down on one another on a piece of celluloid, glass or other smooth clean surface. The surplus water should be absorbed from the pile of prints by means of a blotter, after which good photographic paste should be applied to the topmost print. Then raise the print by taking hold of the two opposite corners and turn it over, placing it in position on the card. After wiping off any superfluous paste which may be on the face of the print, lay a blotter over it, securing contact of print with mount by rubbing the blotter with the hands or passing a print roller over the surface of the blotter, with pressure.

ENAMEL SURFACE PAPERS.

Glossy, Special Glossy or Velvet Velox prints can be burnished or squeegeed. In the latter process wet prints should be placed, face down, on a ferrotype tin, rolled into absolute contact and allowed to become bone dry, when they will peel off with the desired luster. If the tin has been in use for sometime, portions of prints may stick; to prevent this prepare the tins as follows:

Dissolve ten grains of beeswax in one ounce of benzine, allow this to stand for a few hours, in which time a precipitate will be formed. The clear solution should be used for polishing the tins, applying to the surface of the ferrotype plate with a soft cloth (canton flannel). When the surface of the tin has been thoroughly covered with this preparation, the tin should be polished with a piece of dry canton flannel to remove as much of the beeswax as possible. As beeswax varies in its composition to a certain extent, the solution may vary somewhat in consistency so that an addition of benzine may be necessary to permit polishing the tins easily

FAILURES AND THEIR CAUSE.

If you are not entirely successful, you may find below the cause of your trouble.

GRAYISH WHITES—Poor negatives, having no density, old paper or lack of Bromide in developer. Add a few more drops of 10 per cent. Bromide of Potassium solution. May also be caused by trying to force the development of under-timed prints. Possibly light-struck paper.

GREENISH OR BROWNISH BLACKS—Too weak, or too old developer; too much Bromide in the developer; oxidized developer; over exposure. Take a more concentrated developer or use less Bromide.

CONTRASTY PRINTS—Use "Special" Velox, which produces soft results. Negative too harsh, make softer negatives.

Remember that the stronger the developer the softer the print will be.

LACK OF CONTRAST—Negative is too weak. Use "Regular" Velox, which gives more contrast. If you use "Special" Velox you can increase contrast by giving longer exposure, diluting your developer and adding more Bromide.

PRINTS TOO WEAK—Under exposure, or developer too weak. Too weak a negative.

PRINTS TOO BLACK—Over-exposure. See also, "Grayish Whites."

YELLOW OR PURPLE STAIN, SOMETIMES IRREGULAR IN SHAPE—Developer not spread uniformly over the prints, or too long a time elapsed between developing and fixing. When fixing, you should immerse completely in the acid hypo and keep your prints moving during the first few seconds after immersion. Stain all over the prints is the result of trying to force the development of under-timed prints; too weak a developer; incomplete fixing; insufficient washing after fixing, or wash-water containing iron.

BLISTERS—Prints have been creased or broken while washing. Do not allow water to run directly upon the prints from the tap. Too much acid, or too strong hypo may cause blisters, and dilution of the bath may avoid them. Too great a difference in temperature between the solutions and wash water may cause them. *Never use a plain Hypo bath.*

DISCOLORATION AROUND THE EDGES—If the center of the print is clear, it indicates that the paper has been kept in a place where it has been exposed to chemical emanations (ammonia vapors, illuminating gas, coal gas, sewer gas, etc.). May be caused, also, by not spreading the developer evenly and abundantly over the prints.

ROUND WHITE SPOTS—Air bubbles on the surface of the paper, which may be broken by the finger while the print is developing.

WHITE DEPOSIT all over the surface of the print is due to milky hypo

bath.—If washed off thoroughly this does no harm. Can be removed by means of a damp sponge when prints are dry.

PICTURE DEVELOPS IRREGULARLY ("FREAKS") and appears to be covered with irregular greasy streaks, as if the paper were not coated uniformily, or had been touched with greasy fingers.—This defect occurs while developing, and is the result of the use of impure sulphite which contains sulphate. Too dilute a developer may cause the same defect. Soaking the paper in water before developing may avoid it, *in case concentrated developer or pure sulphite is not at hand.*

We cannot be too emphatic in our statement that "freaks" will not occur on any sheet of Velox manufactured, if a bath is used in accordance with our formula, and if in preparing it fresh and pure chemicals are used.

PICTURE IS GOOD BUT SURFACE IS COVERED WITH MARKS, USUALLY RUNNING IN ONE DIRECTION.—This occurs mostly with Glossy Velox and is the result of pressure or friction. These surface marks can usually be removed from the dry print by rubbing the same with a tuft of cotton dipped in wood alcohol. On Matt Velox, surface stains can be removed by means of a soft rubber. Remedy: Use N. A. Velox Liquid Developer.

GRADES AND WEIGHTS OF VELOX.

DOUBLE WEIGHT VELOX is made in

SPECIAL VELVET (Semi-gloss). SPECIAL PORTRAIT (Semi-matt). SPECIAL ROUGH (Rough-matt).	For Use With Contrasty Negatives.
REGULAR CARBON (Smooth matt). REGULAR VELVET (Semi-gloss).	Flat Negatives.

Double Weight papers require no mount and should be printed under a cut-out, which will insure a white margin, relieving the print and giving the effect of a mounted photograph.

SINGLE WEIGHT VELOX is made in

SPECIAL VELVET (Semi-gloss). SPECIAL PORTRAIT (Semi-matt). SPECIAL ROUGH (Rough matt). SPECIAL GLOSSY (Enamel surface). SPECIAL CARBON (Smooth matt).	For Use With Contrasty Negatives.
REGULAR VELVET (Semi-gloss). REGULAR ROUGH (Rough matt). REGULAR GLOSSY (Enamel surface). REGULAR CARBON (Smoot matt).	Flat Negatives.

VELOX POST CARDS are made in

VELVET (Semi-gloss).
SPECIAL PORTRAIT (Semi-matt).

When selecting the grades of paper, remember that any negative which will produce good results on printing-out paper, requires Special Velox.

SEPIA TONES ON VELOX.

Beautiful Sepia tones are readily obtained on Velox prints by the use of Velox Re-Developer. A package of this contains the "bleaching agent" in which a finished print is first placed after which it is "Re-Developed" coming out a rich deep Sepia. The following simple directions fully explain the process :

TO PREPARE SOLUTIONS : Prepare bleaching bath by dissolving contents of one capsule (marked Bleaching Agent) in four ounces of water to which should be added three drops of pure aqua ammonia.

Prepare re-developing solution by mixing one-half ounce of the liquid from the bottle with one pint of water.

DIRECTIONS : (1) Immerse print in bleaching bath, letting it remain until only faint traces of half-tone are left and the black of the shadows has disappeared. (The image will then resemble that of an undeveloped Platinum print.) This operation will take about one minute.

(2) Rinse thoroughly in clean cold water.

(3) Place in re-developing solution until original detail returns. (For about fifteen seconds.)

(4) Wash for half an hour in running water.

DEKKO AND AZO PAPERS.

Dekko and Azo may be exposed the same as Velox.

After taking prints from the printing frame, soak them for a few seconds in clear cold water. This softens the paper and allows the developer to act freely and evenly over the surface of the print. Place the print in the developer tray and pour on the developer. If it has been properly timed or exposed, it will develop rapidly. When it is fully developed, or has reached the required density, *it should be dipped in water for a second*, to remove the greater part of the developer, then immediately transferred to the Acid Fixing Bath. It is necessary at this stage to keep the print moving for a few seconds, or until the fixing has started to act evenly over the surface.

DEVELOPER.

For your devoloper make up a stock solution as follows :

Amidol,	80 grains.
Sulphite Soda (crystals),	200 grains.
Water,	10 ozs.

To develop take :

Stock Solution,	1½ oz.
Water,	3 ozs.
10 per cent. Solution Bromide of Potassium,	3 to 5 drops.

ANOTHER DEVELOPER.

The following formula may be substituted for the Amidol formula recommended above when desired and will be found to give most excellent results :

HYDRO-METOL DEVELOPER.

Water,	12 ozs.
Metol,	7½ grains.
Hydrochinon,	30 grains.
Sodium Sulphite, crystals pure,	218 grains.
Sodium Carbonate (Crys.),	163 grains.

Dissolve and add about 25 drops of a solution composed of Bromide of Potassium, ½ oz., water, 5 ozs. This solution is to be used without diluting.

Olive green tones may be obtained by diluting developer with two or three ounces of water and adding 12 to 15 drops of the Bromide of Potassium.

NOTE—For those who do not care to go to the inconvenience of making up the formula given for developing, they will find "Dekko Developing Powders" invaluable. These are accurately compounded and insure the best results obtainable from pure chemicals.

FIXING.

Prints should be fixed for fifteen minutes in the following bath :

HYPO BATH.

Hypo-sulphite Soda,	1 oz.
Acetic Acid (or Alum ¼ oz.,)	4 drops.
Water,	5 ozs.

After they are fixed they may be washed and dried the same as Velox.

PHOTOGRAPHS IN COLOR.

This process is a trifle uncertain owing to the fact that the slightest variation in the temperature of the developer, the quality of the chemicals or the time of exposure will decidedly affect the results. Nevertheless, this process is very interesting.

The colors obtainable are green, brown, orange and red with their intermediate shades. The prints closely resemble carbon prints, particularly when the Carbon Velox or Carbon Dekko is used, and without the troublesome manipulations necessary in carbon printing.

Either Metol or Hydrochinon can be used—but the most satisfactory results, on the whole, are obtained by the use of a combination of the two. Prepare the developer according to the following formula : water, 1 oz.; Metol, 7 gr.; Sodium Sulphite, 24 gr.; Hydrochinon, 3 gr.; Sodium Carbonate, 40 gr.; Potassium Bromide, 1 to 10, 5 drops.

This developer will give a good black. Make a stock restrainer composed of water, 1 oz.; Ammonium Bromide, 20 gr.; Ammonium Carbonate, 20 gr.

The exposure will be many times that necessary for black tones and unless Welsbach gaslight can be used, daylight will be found less trying to the patience, particularly when red or brown prints are wanted. Different exposures will of course be required for the various grades of Velox and Dekko, those below being for Dekko, which seems to allow of the most pleasing variety of colors. For use, one ounce of developer is diluted with an equal quantity of water and stock restrainer added in varying proportions. For prints in green, add four drams stock restrainer.

Exposure should be about 30 times that required for black tones.

BROWN : Use 6 drams stock restrainer instead of 4, and expose about 120 times exposure for black.

ORANGE : Use 8 drams stock and expose about 60 times exposure for black.

RED: Use 12 drams stock and expose about 150 times exposure for black.

The brown obtained by the use of 6 drams stock is a pleasing yellow-brown. A red-brown can be obtained by using the developer as prepared for red tones and exposing about 30 times exposure for black.

A good quick printing negative, with Dekko and above undiluted developer will produce a black print at noon on a clear day, at the unobstructed north window, in about one-tenth second, so for red tones about 15 seconds would be required; with gaslight at four and a half inches about 20 minutes, and with Welsbach light about seven minutes will be necessary. The longer the exposure and consequently the shorter the development, the yellower the tones; the longer the development the browner the tones. Development must not be carried too far or the print will be darker than desired. All the colors dry darker than they appear when wet and, with the exception of the green, change color. The orange before drying is a lemon-yellow, the red is a light yellowish terra-cotta which dries a bright Bartolozzi red. If the prints are muddy without proper contrast, the exposure has been too long.

Fix in the usual acid bath.

PRINTING-OUT PAPERS.

Printing-out papers are so called because, unlike a negative, the image appears without development, and they require only toning and fixing. Printing-out papers are simple to handle, and are popular with both professionals and amateurs. Indeed, nearly all of the paper used by professional photographers in the United States is a printing-out paper of the brands which this booklet will instruct you in using.

Solio, Kloro, Rex and Albuma are Gelatino-Chloride papers. Aristo Platino and Aristo Self-Toning are Collodio-Chloride. With the former the silver-chloride and other salts are held in position in gelatine, while with the latter they are held in position in collodion.

Of the many papers offered, one of the most desirable, for the beginner at any rate, is a gelatino-chloride (chloride of silver in an emulsion of gelatine) printing-out paper. In the printing-out paper the image "prints-out" at once. Before it is toned and fixed it is in the same condition as a proof received from the photographer. The chemical action clears the high lights and shadows, gives the proper tone and "fixes" the print, *i. e.*, makes it permanent.

The process of toning and fixing may be combined in one bath or may be done separately. For convenience we recommend the combined bath to the amateur, but care should be exercised not to overwork the bath. This bath will continue to give satisfactory tones long after the gold has been exhausted. This toning without gold, however, is not permanent and no attempt to economize by overworking the toning bath should be made, as disappointment will be the inevitable result.

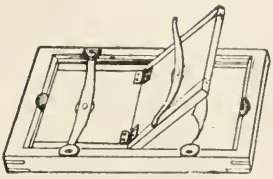
THE PAPER.

Keep your paper in a dry place. Do not expose it to moisture or the fumes of coal gas, it being very sensitive to either.

UNTONED PRINTS.

When you have taken the print from the printing frame it is still sensitive, containing, as it does, most of the original silver chloride, and should you expose it to the light it would soon blacken all over. Keep your prints, after removing from the printing frame, in a dark box until you are ready to tone. Handle as little as possible and do not allow the fingers to come in contact with the surface of the paper.

METHOD OF PRINTING.



THE PRINTING FRAME.

Open the printing frame and lay the negative back down upon the glass* (the back is the shiny side). Place upon this a piece of Solio paper, face down. Replace the back of the frame and secure the springs. The back is hinged to permit of uncovering part of the print at a time to inspect it without destroying its register with the negative. The operation of putting in the sensitive paper must be performed in a subdued light, that is to say, in an ordinary room, as far as possible from any window. The paper not used must be kept covered in its envelope.

The printing frame, when filled as directed, is to be laid glass side up in the strongest light possible (sunlight preferred) until the light, passing through the negative into the sensitive paper, has impressed the image sufficiently upon it. The progress of the printing can be examined from time to time by removing the frame from the strong light and opening one-half of the hinged back, keeping the other half fastened to hold the paper from shifting. The printing should be continued until the print is a little darker tint than the finished print should be.

As soon as the print is finished place it in a drawer or box where it will be protected from the light until your batch of prints is ready for toning.

HOW DEEP TO PRINT.

For the combined bath the printing should be carried about two shades deeper than you desire the finished prints to be as they will lose considerable in toning and fixing. For the separate bath about one shade deeper.

Prints will keep three or four days before toning, providing they are stored in a dark box.

TONING WITH THE COMBINED BATH.

For one just starting to tone prints, we would recommend the combined bath. This will be by far the most simple in manipulation (the toning and fixing being done in one bath) and with proper attention to the instructions you should be able to secure prints of a soft, rich tone, ranging in color from a warm Sepia to a dark purple. Solio Combined Toning and Fixing Solution may be had of any Kodak dealer.

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*When printing from glass plate negatives no glass is needed in the printing frame, the plate itself fitting into rabbet of frame.

Place prints without previous washing in the following combined toning and fixing bath.

2 ozs. Solio Toning Solution.
4 ozs. *cold* water.

Pour the toning solution into a suitable tray and immerse the prints one after the other. Five or six prints can be toned together if they are kept in motion and not allowed to lie in contact. Turn the prints all face down and then face up and repeat this all the time they are toning. The prints will begin to change color almost immediately from reddish brown to reddish yellow, then to brown and finally to purple. The change will be gradual from one shade to another and the toning should be stopped when the print gets the shade desired.

Six ounces of the diluted toning solution will tone two dozen 4 x 5 prints ; after that a new solution should be made same as before.

When the proper shade has been attained in toning bath the prints should be transferred for five minutes to the following salt solution to stop the toning :

Salt,	1 oz.
Water,	32 ozs.

Then transfer the prints to the washing tray and wash one hour in running water, or in sixteen changes of water.

The prints are then ready for mounting or they can be laid out and dried between blotting papers.

If desired the amateur can mix his own toning bath, but in so doing should exercise great care in getting pure chemicals and using exactly the proper proportions.

STOCK SOLUTION.

A	Hypo-sulphite of Soda,	8 ozs.
	Alum (crystals,)	6 ozs.
	Sugar (granulated),	2 ozs.
	Water,	80 ozs.

Dissolve above in *cold water*, and

When dissolved add Borax,	2 ozs.
Dissolve in hot water,	8 ozs.

Let stand over night and decant clear liquid.

STOCK SOLUTION.

B	Pure Chloride of Gold,	7½ grains.*
	Acetate of Lead (Sugar of Lead),	64 grains.
	Water,	8 ozs.

Solution B should be shaken up before using and not filtered.

*Or double the quantity of chloride of gold and sodium.

To tone fifteen 4 x 5 prints take:

Stock Solution A,	8 ozs.
Stock Solution B,	1 oz.

Place prints without previous washing into the above.

Tone to desired color and immerse prints for 5 minutes in following Salt Solution to stop the toning:

Salt,	1 oz.
Water,	32 ozs.

The extra fixing bath should be used to ensure *thorough fixing*.

After the salt bath, give one change of cold water and fix for 10 minutes in the

EXTRA FIXING BATH.

Hypo-sulphite of Soda,	1 oz.
Sulphite of Soda (crystals),	60 grains.
Borax,	¼ oz.
Water,	20 ozs.

Wash one hour in running cold water or in sixteen changes of cold water, when prints may be mounted.

The combined bath must be started cold, not above 50° Fahr., and must not be allowed to rise to temperature above 60° Fahr. This condition can be obtained by placing a piece of ice in the bath when toning. If the bath is too warm, you will get yellow prints with a greenish cast in the half-tones.

Use a thermometer and keep it in toning bath all the time.

The combined bath is an acid solution. The borax neutralizes only the *excess* of acid in the alum. Any attempt to neutralize the bath will precipitate the alum.

The combined bath should not be used a second time.

If troubled with white spots or blotches on prints, clean trays with nitric acid or sulphuric acid and water.

TONING WITH THE SEPARATE BATH.

WASHING THE PRINTS.

After taking the prints from the print frame, immerse them one at a time in a tray of running water. (When washing and toning prints use trays that have never come in contact with Hypo, as the least trace of that chemical will cause dark brown stains that cannot be gotten rid of.) Keep them moving so that all shall receive an equal amount of washing.

When you place a print in the water the soluble silver, or that portion not used to form the image, dissolves and is washed out; this forms with

other substances in the water a new combination which can easily be detected by its white, milky appearance. Prints to be properly washed should remain in the running water until this has entirely disappeared. Should you not have running water, they can be washed by using two trays and transferring the prints (one at a time) from one to the other, changing the water each time.

This should be done quickly at first but after you have washed out most of the free silver, the changes may be made five minutes apart. The temperature of the water should be as near 60° Fahr. as possible.

THE TONING BATH.

Tone in a plain gold bath, using about 1 gr. of gold to 48 ozs. of water. Neutralize by adding a saturated solution of borax, bi-carbonate of soda or sal soda.

This should be made up at least one-half hour before using; this gives the chemicals a chance to harmonize. When making the toning bath, first measure the water and pour into the tray or dish you are to use, then add the gold. Now take a piece of red Litmus paper (this is very sensitive to acid or alkali) and place in the solution. Then add the borax solution drop by drop (this is a strong alkali and should be kept in a bottle, the cork of which has a small slit in it allowing the solution to drop, not run out) just enough to turn the Litmus paper blue in five minutes. This will make the bath almost neutral, *i. e.*, slightly alkaline. The bath is now ready for use. Should the prints tone fast in the high lights, or light parts of the prints, leaving the shadows, or dark parts, very red, and when finished have a muddy (not clear) appearance, that indicates that you have used too much borax or alkali. On the other hand, had the Litmus paper remained its original color (red) that would indicate that the bath was acid and that you had not used sufficient alkali. With the bath in that condition your prints would not tone but bleach, lose their brilliancy and become flat.

When toned, immerse prints in running water where they may remain until all are ready for the fixing.

If running water cannot be had put prints into

SHORT STOP:

Salt,	1 oz.
Water,	1 gal.

If there is a large batch of prints to be toned do not allow prints to lie in short stop solution, but put them into a tray containing clear water where they may remain until all are ready for the fixing.

FIXING BATHS.

Fix twenty minutes in

Water,	1 gal.
Hypo,	13 ozs.
Solio Hardener,	½ oz.

To mix with Hydrometer, take water 1 gal., add sufficient Hypo to test 25 gr. to the oz. and add ½ oz. of Solio Hardener.

On account of its simplicity and cheapness, we advise the Solio Hardener Fixing Bath, but give the alum fixing bath for the benefit of those who prefer it.

ALUM FIXING BATH:

Hypo-sulphite of Soda,	6 ozs.
Alum (Crystals),	2½ ozs.
Sulphite of Soda (Crystals),	⅜ oz.
Water,	70 ozs.

When dissolved add ¾ oz. of borax dissolved in 10 ozs. hot water,

This fixing bath must be made about 10 hours before use. As it keeps indefinitely before use it may be made up in large quantities.

After fixing in one of the foregoing baths, wash 1 hour in running cold water or in 16 changes of cold water, keeping prints separated so the water may have a chance to eliminate the chemicals.

DETAILS.

The toning bath should tone in 6 or 7 minutes.

Tone by transmitted light for the high lights and half tones only, paying no attention whatever to the shadows.

We recommend a neutral bath and advise the use of Squibb's red litmus to test with.

If the bath tones uneven or streaky, add water until it tones in 8 or 10 minutes, and make it slightly alkaline.

One gallon of fixing bath is sufficient for one gross 4 x 5 size Solio or its equivalent.

Prints allowed to stand over night in water are liable to turn yellow; they should therefore be mounted as soon as washed.

To make Solio Hardener:

Chloride of Aluminum,	3 ozs.
Bi-Sulphite of Soda,	2½ ozs.
Cold Water,	12 ozs.

Put both chemicals in the water and shake until dissolved.

GLOSSY PRINTS.

Few amateurs care to go to the expense or trouble of burnishing their own prints, but they can readily obtain a beautiful glacé finish in a simple manner by drying prints on ferrotype plate in the following manner:

1. Clean the ferrotype plate with hot water each time it is used. Polish with a soft cloth until plate is absolutely free from dirt or specks of any description. Swab with a tuft of soft cloth or cotton batting, wet with a solution composed of benzine 1 oz., paraffine 10 grs. Rub dry with a clean cloth, and polish with a chamois skin or very soft cloth. Use a soft brush to remove particles of dust from plate.

2. Lay the wet print on the ferrotype plate. It must be in perfect contact to produce a uniform glossy surface. This contact is better secured by avoiding air bells in laying the print down than by endeavoring to expel them by heavy pressure—light rolling with a print roller (with cloth between) is all that is required—heavy pressure being liable to make prints stick in spots.

3. When surface is dry brush over the back of the print (while still on the plate) with a thin solution of white glue.

4. When "bone" dry strip the print from the plate and lay the print on a mount, the face of which has been well moistened with a wet sponge.

5. Rub down with a dry blotter, then dry face up, free from dust.

NOTE.—Prints finished by the above process can be kept very nicely unmounted if so desired, the glue on the backs preventing curling.

PRINTING ON MATTE COLLODION PAPER.

AMERICAN ARISTO.

PRINTING.

Print deep or until the high lights are well tinted. Pay no attention to the shadows no matter how much they bronze. That will tone out.

NOTE.—Thin negatives should be printed in the shade, while those that are dense and have much contrast can be printed in the sun.

WASHING.

Place prints in the water, one at a time, face down, pressing each print to the bottom of the tray; not in a pile, but in an irregular manner, partly covering one another. This will stop all tendency of the paper to curl.

Should you use running water, prints should be handled over continually. If prints are to be washed by hand they should go through six changes of clear water, taking about five minutes for each change. During that time prints must be handled same as in running water. To tone properly they must be washed thoroughly. The best results are obtained when water is from 65° to 75° Fahr.

TONING.

The toning of matte collodion paper is usually accomplished by the aid of two separate baths, the gold and platinum; but should one prefer a single bath, producing similar results, we recommend the "Aristo Single Toner," a toning agent combining in one the action of both the gold and platinum.

A print very slightly toned in the gold bath and toned long in the platinum bath takes a greenish or olive black tone, while a print toned to a purple in the gold bath and slightly toned in the platinum will give a pure black.

Prints require a thorough washing when coming from the gold bath, as gold precipitates platinum, and unless all the free gold is washed from the prints, the platinum will be precipitated to the bottom of the tray and not on the prints.

GOLD BATH.

Chloride of Gold and Sodium, - - -	¼ gr.
Water, - - - - - -	8 ozs.

Add borax to make bath slightly alkaline. *Test with red litmus paper. When bath is sufficiently alkaline the litmus paper will turn blue slowly.*

Tone until purple, then wash in 3 changes cold water.

PLATINUM SOLUTION.

Make up solution consisting of

Platino-Potassium,	15 grs.
Phosphoric Acid, U. S. P.,	⅓ oz.
Water,	15 ozs.

PLATINUM BATH.

To tone, take

Platinum Solution,	½ dram.
Water,	8 ozs.

Tone until proper shade is reached.

Wash in 4 changes and immerse ten minutes in

FIXING BATH.

Saturated Solution Hypo-sulphite Soda,	½ oz.
Water,	8 ozs.

Wash 1½ hours in running water or in 18 changes of water, not less than five minutes in each change.

NOTE.—Do not use the same tray for both gold and platinum baths Have one for each. Prints must be thoroughly washed after coming from platinum bath and before fixing. Platinum is very acid, and it is necessary to entirely eliminate this from the prints, otherwise you carry it into the Hypo bath, producing sulphurization and yellow spots.

WASHING AFTER FIXING.

Prints are better if washed by hand through ten or twelve changes of water, about five minutes for each change. Handle the prints well during that time. Do not let them mat together. When prints are washed they are ready to mount.

ARISTO SELF-TONING PAPER.

This paper is a glossy collodion paper, and as its name implies, requires no toning or developing solutions, all chemicals required being embodied in the sensitive emulsion with which the paper is coated.

PRINTING.

Print a very little darker than you wish the finished print to be.

WASHING.

After printing, place prints one at a time, face down, in the following bath:

Table salt,	½ oz.
Water,	32 ozs.

The above is for a small number of prints. For a gross of cabinet size

paper you would require one gallon (128 ounces) of solution. Allow prints to remain in this bath about five minutes or until the desired tone is obtained. See that prints are well separated by handling them over four or five times and flatten them each time by pressing them to the bottom of the tray. As prints are toned transfer them to a tray of clear water. When all are toned place them in a solution of carbonate of soda, ¼ dram of carbonate of soda to 32 ounces of water. This will prevent bleaching and will also neutralize the prints. Handle them over for about five minutes in this bath; they are then ready for the Hypo or fixing bath.

Fix and wash same as for American Aristo, page 116.

MEZZO-TONE PAPER.

This is a gelatine paper which is very simple in its manipulation and which gives very pleasing brown prints.

Print until slightly darker than the finished print should be.

CLEARING SOLUTION.

Place prints in following solution for ten minutes:

Salt, one even (not heaping) teaspoonful, -	60 grains.
Cold Water, - - - - -	20 ozs.

Rinse in three changes of *cold* water, then place in

FIXING BATH:

Hyposulphite of Soda, - - - -	13 ozs.
Solio Hardener, - - - - -	¼ oz.
Water, - - - - - -	1 gal.

For smaller quantity use:

1 oz. Hypo and 10 drops Solio Hardener to each 10 ozs. water.

Fix for fifteen minutes then wash for not less than one hour in running *cold* water or in sixteen changes of *cold* water.

Mount in the usual manner.

If prints become soft in final washing use an increased amount of Hardener.

FOR COLDER TONES.

The salt clearing bath given above produces tones of a rich, warm brown. Those who prefer a colder tone, however, can readily secure it by using the sulpho-cyanide bath given below.

We are perfectly aware of the prejudice existing against this bath as formerly used with chloride papers, but neither theory nor practice seem to show any reason why it cannot be satisfactorily used with Mezzo-Tone.

The gold for toning being in the paper itself and ready to completely plate the silver the instant it is released, the chemical disruption which sulpho-cyanide might, in time, cause with a toning bath, does not take place, or if it does take place the action sets in after the silver has become gold-plated, and is, therefore, beyond the possibility of damage from this source. At any rate, an experience with the sulpho-cyanide bath in connection with this paper, extending over a period of over a year, has shown that it produces satisfactory and permanent prints.

SULPHO-CYANIDE BATH.

Ammonium Sulpho-Cyanide, - - -	20 grs.
Water, - - - - - -	20 ozs.

Prints in the sulpho-cyanide bath will first tone to a purple color, and in about three minutes will start to turn yellow. At this point the prints should be removed to the rinsing water.

Fix and wash in same manner as when salt clearing solution is used, as described above.

If desired the photographer may make up his own hardener solution by using the formula given on page 113.

WATER DEVELOPMENT PAPERS.

W. D. PLATINUM.

Every amateur who has limited facilities and time will especially appreciate a paper which requires nothing but water and acid for the entire process of developing and clearing. In W. D. (water development) Platinum one has a paper giving pure platinum tones and producing effects equal to any photographic process.

PRINTING.

Place paper face to face with negative (the face of paper is the yellow side) and print in sunlight until shadows are a deep canary color, and the high lights are slightly visible. In watching the progress of printing, care should be taken not to expose to strong light, as this paper is very rapid, and there is danger of fogging high lights unless due caution is observed.

DEVELOPING.

When printed to proper depth, immerse print in hot water (110 degrees Fahr.) face up, sliding it in edgewise to avoid air bells. Development will require but a few seconds, after which the print is to be plunged into the

CLEARING BATH.

Cold Water, - - - - -	15 ozs.
Muriatic Acid, c. p., - - - - -	¼ oz

Soak print face down for five minutes each in two changes of clearing bath. Wash for fifteen minutes in running water or five changes of clear water, five minutes in each change.

Paper should be developed as soon as possible after printing, never later than the same day.

THE NEGATIVE.

The foregoing directions apply where print is made from negatives of normal density. If an under-timed or weak negative is to be printed from, strength can be gained by printing under blue glass.

The best results are obtained by the use of perfectly timed and fully developed, but not "harsh" negatives.

KEEP THE PAPER DRY.

NOTE.—To prevent injury from moisture, Eastman's Water Development Platinum Paper is packed in air-tight tubes, each tube containing a lump of preserative.

When printing, remove only as much paper as is to be immediately used, keeping the balance of paper in the tube with the preservative, tightly closing tube with sealing tape. During hot weather, keep the paper (in the sealed tube) in an ice box.

Always keep the paper in a cool, dry place.

Keep the printing frame pads dry.

On days when the atmosphere is over-charged with moisture, especially in summer, this paper will print out very rapidly in the shadows; printing should, nevertheless, be continued until outlines begin to appear in the high lights.

HINTS.

A novel but good method of development is to hold print over steaming water until development is nearly completed, and then immerse for a few seconds in hot water. This method gives particularly rich, brilliant prints.

Do not use what is known as "Commercial Muriatic Acid." The acid must be chemically pure, and should be colorless.

Use a fresh acid bath for each batch of prints.

Weak prints are caused by too cold developer, weak negatives or damp paper.

Dry by removing surface water and laying prints between blotters.

Mount in usual manner with any good starch paste and bring into contact with print roller.

FERRO-PRUSSIATE OR BLUE PAPER.

For certain subjects the "Blue Print" will give much satisfaction; for instance, negatives in which clouds predominate, certain classes of interiors, winter scenes, etc. With negatives of this description the finished prints will present a richness of effect seldom equaled. Apart from those qualities it possesses abundant capacity for giving detail and a wide range of tone, from light to dark. It is also a ready means for making finished proofs when one's time is limited.

PRINTING.

Print until the shadows commence to bronze, a condition which will be readily observed after a few trials. After printing, immerse in a tray of clean water. Change the water every five minutes for half an hour or until

the whites are clear. The prints can then be dried between blotters. When dry they will have obtained much brilliancy.

When washing prints, should they appear light or wash off the paper, it is the sign of under exposure.

Over printing should be avoided as it has a tendency to flatness and loss of detail.

EASTMAN'S SEPIA PAPER.

The rich, soft sepia tones obtained on this paper, together with the simple process necessary for development make it one of the most pleasing of "water developing" papers to handle.

For negatives containing bold, sketchy effects, and those having a tendency to harshness, it is particularly adapted.

PRINTING.

This paper is about three times as rapid as blue paper, and should be under rather than over printed. This can easily be determined after one or two trials.

DEVELOPMENT.

Prints should be thoroughly washed in six changes of water and then fixed for five minutes in a very weak solution of Hyposulphite of Soda.

Hypo,	15 grains.
Water,	10 ounces.

NOTE.—Short fixing gives red tones. Longer fixing produces a brown tone.

After fixing, prints should be washed thoroughly. Dry by removing surface water and laying prints between blotters.

To secure brilliant prints, paper should be washed immediately after printing.

This paper is put up in tubes and should be kept in a cool, dry place, as it is liable to deteriorate upon contact with moisture. Keep tubes sealed.

SPOTTING PRINTS.

Small spots showing white on the prints can be filled in or "spotted" with equal parts of Indian red or India ink mixed with a little water and applied with a small camel's hair brush, or one can use the ready prepared "Aristo Spotting Colors."

Platinum Printing.

ALFRED STIEGLITZ.

Of all the modern printing processes at the command of the photographer, whether amateur or professional, none deserves to be more popular than the platinum. The simplicity of manipulation, combined with the beauty of the results obtained with it, is enough to recommend it to every photographer. And above all, the prints produced by this method are as permanent as the paper which supports the image.

Its range of yielding the strongest blacks with pure lights and a long scale of intermediate half-tones or grays, is only equalled by the carbon process. The platinum print has an indescribable charm, suggesting atmosphere, though the negative printed on another medium may be entirely devoid of this valuable pictorial quality.

Notwithstanding these decided beauties and charms, the great majority of photographers, and especially beginners, imagine that platinum printing belongs to the advanced stage of photography.

Excluding the process of producing blue-prints, none is so easy and simple, and none requires so few chemicals and so little time and trouble to produce a finished print.

In printing, the image is only partially visible and it takes a little experience in overcoming the difficulty in judging how far to go. This factor has undoubtedly been the great bugbear of this otherwise almost ideal photographic printing process, and has been the cause which frightens the beginner who has generally accustomed himself to some of the printing-out silver papers. But in consideration of the fact that the difficulty is often more imaginary than real, and that the manipulations of developing, cleaning and washing hardly take more than a few minutes, is it not worth while to at least try this mode of printing?

The paper is manufactured in sheets 20 x 26 inches, but can be bought from any dealer in any desired size, packed in dozens in a tin tube. The writer wishes to warn the beginner not to buy the paper in any way but in tins, for otherwise he will not receive the paper in proper condition. The advice of some dealers in this matter is ruinous. The paper is packed in tin tubes, as it is extremely sensitive to damp, which spoils it. Each tin contains a bit of cotton wool, enclosing a small piece of asbestos, saturated with calcium chloride, which absorbs all traces of moisture apt to get into the tube, which would otherwise attack the paper.

In a fairly cool place it keeps for months. Excessive heat will deteriorate it rapidly, so that in a very hot climate it is best to keep it in a refrigerator.

Inasmuch as the paper is more sensitive to light than the gelatine and

collodion silver papers in the market, it must be handled in subdued light, that is, not too near a window nor out of doors.

After opening a tube and taking out a sheet for printing purposes, pack away the balance exactly as originally packed, and the sheets can be kept until wanted.

The paper is exposed in the usual way to daylight, (sunlight preferably, according to the writer's opinion,) and is examined from time to time to note the process of the printing. This must be done with the back to the window. The image is only partially visible. A little practice will teach you how far to print ; actinometers, as recommended by some, being entirely unnecessary. The developing is done by immersing the print in a solution of oxalate of potash, which brings out the image in its full strength nearly instantaneously. It is then put directly into a weak solution of hydrochloric acid to clear it, and then washed. This is the outline of the process. Full particulars and detailed instructions are enclosed in every tube of paper.*

The paper comes in various varieties, which are marked as follows :

AA (smooth, thin.)
BB (smooth, stout.)
CC (rough, very stout.)

These are the cold bath papers which are in general use here in the United States, and which give pictures of a black image.

Besides this class, the Platinotype Company manufactures the "Sepia" papers, which are developed hot, and give a rich brown print. They also come in the various varieties of smooth and rough.

The most popular of all these grades is that known as CC; it is a tough heavy paper, with a decided tooth or grain like a rough drawing medium. It also has better keeping qualities than any of the others.

It cannot be impressed too greatly upon the beginner that moisture is the greatest enemy of the process, and that it is necessary for him to keep printing-frames, pads and negatives bone dry, if he is aiming at superior results. For certain effects it is sometimes desirable to allow the paper to absorb some moisture, but this will hardly be in the line of a beginner. It is therefore to be recommended before starting a day's printing to dry the printing-frames and pads in the kitchen or in some dry place, and even to dry the negatives if the air is laden with humidity. Gelatine is very hygroscopic, that is, readily absorbs moisture. It might also be pointed out that

*[NOTE.--The development of "cold bath" platinotypes recommended by the manufacturers provides for the use of their own developer.

As soon as print is removed from developing dish it must be immersed face down for five minutes in the following bath: Hydrochloric acid, 1 part; water, 60 parts. Remove to a second acid bath for ten minutes and to a third for fifteen minutes. Wash fifteen minutes in at least three changes of water.

The sepia papers are similarly handled except that to each ounce of developer is added one sepia tablet (put up by the manufacturers of the paper) and developer is used hot: 150° to 160° Fahr.—ED.]

with paper which is old and perhaps slightly damp, printing need not be carried as far as with fresh and dry paper.

Most photographers have an idea that the platinotype process requires a so-called "plucky" and "brilliant" negative. This is not the case. Any negative which gives a good result with other papers will yield good prints with platinum.

As a beginning the tyro will do well to closely follow the instructions enclosed in every tube of paper. After having fully mastered all the operations, and feeling thoroughly at home in the manipulation of the paper, he may, if he so desires, sometimes alter the directions to suit special purposes.

In using the cold-bath paper, it is at times advantageous to develop it *hot*. This can be done in case one is printing from a rather harsh negative, which if developed in the ordinary way would yield a print devoid of all gradation or half-tone. If developed *hot*, the same print will come out with considerably more softness, that is, yielding more half-tones.

In other words the temperature of the developing bath has a decided influence on the tonality of the print, as also on the color of the image.

The colder the bath, the colder the image may be set down as a rule. The warmer the bath, the warmer the image. Thus, one is enabled at will, to produce either a cold blue-black picture or one of a warm black, the resulting color depending entirely upon the temperature of the oxalate solution.

Dampish paper yields prints of a brownish black color, with a tendency to mealiness.

At times, it is desirable to increase the vigor of a print, and in order to accomplish that result the print must be developed in the following developer, recommended by Horsley Hinton :

Oxalate of Potash,	1 lb.
Phosphate of Potash,	4 ozs.
Sulphate of Potash,	½ oz.
Water,	6 pints.

This solution develops the prints rather slowly, and is especially suitable for prints from very flat negatives.

It may be remarked that although the Platinotype Company recommends its own developer for use with their paper, I have found the pure neutral oxalate of potash fully its equal. Their salts undoubtedly contain some phosphate of potash besides the oxalate.

Platinum prints may be toned in various ways.

The most common is the "Uranium" which changes the color to a rich-brown or red-brown. The ordinary uranium intensifier may be used for this purpose, the print simply being immersed in it for a time.

An excellent method for uranium toning is given by A. Horsley Hinton:

SOLUTION 1.

Uranium Nitrate,	48 grains.
Glacial Acetic Acid,	48 minims.
Water,	1 oz.

SOLUTION 2.

Potassium Ferricyanide,	48 grains.
Water,	1 oz.

SOLUTION 3.

Ammonium Sulphocyanide,	½ oz.
Water,	1 oz.

For use take ¼ oz. of each, Nos. 1, 2 and 3, and 25 ounces water.

A finished unmounted platinotype print, thoroughly cleared from all iron salts, is placed in a flat dish and flooded with the above solution and the dish rocked continuously.

The color of the print will gradually change, the toning should be carried on a little further than when the desired tint has been reached, as the picture will dry out a little colder in color than it appears in the toning bath. It is now brought into a dish of water containing a few drops of glacial acetic acid. The water must not be alkaline, as it would dissolve the uranium compounds deposited on the print and thus change its color again. This property of alkaline water may be made use of in case the desired color of the toned print is unsatisfactory, and one wishes to get it back into its original condition.

It has, as yet, not been conclusively proven that platinum prints treated with uranium are permanent.

It is possible to control this image during development and to make various changes in the various tones of the picture.

This can be accomplished by using the glycerine method, referred to in the platinotype instructions.

It consists essentially of painting the image by means of the oxalate solution, using a brush for the purpose, the paper having first been exposed to light under the negative in the ordinary way.

The method is so full of latitude, that prints have been produced by its means that look like fine wash drawings.

In short, it will be seen by the various matters referred to in this short résumé of the platinotype process, that it is beyond doubt the printing method *par excellence* for the amateur.

NOTE—Since the foregoing article on Platinum printing was first published other excellent Platinum papers have been introduced, among them the American Platinum, manufactured by the American Aristotype Company.—[ED.]

AMERICAN PLATINUM PAPER.

In the production of the American Platinum Paper two very serious defects in the platinum paper heretofore manufactured have been overcome. First, solarizing in shadows; second, the fuzzing or abrading of surface by handling. The manipulation of this paper is very simple, and with a reasonable amount of care there should be no difficulty in obtaining good results. The instructions, although simple, must be followed in every detail if the best results are desired. This paper will keep in good condition for a long time if not exposed to heat or dampness. The unprinted paper should be stored in a cool, dry place. When paper is removed from the tube see that the sheets not intended for immediate use are returned to the tube with the package of preservative, and the tube carefully sealed with the tape. If the tube is allowed to remain open, or the paper removed from the tube several hours before using, the effect of damnpess will be noticed in the lack of strength and brilliancy in the prints. Dampness will also cause high lights to develop gray instead of pure white.

PRINTING.

Although not absolutely necessary, it is advisable to use thin rubber pads in the backs of printing frames, especially in those sections of the country where the atmosphere is full of moisture. See that negatives and pads used in printing frames are perfectly dry, or the result will be the same as when paper is exposed to dampness before printing. In handling paper, care should be taken not to expose it to strong light. Put paper on negatives and examine prints in weak daylight or artificial light. Care should always be taken not to touch the sensitized surface of the paper with the fingers. This is very important where the hands perspire freely.

Print until the image is visible in all parts, although weak and only faintly outlined in the stronger portions of the negative. The exact depth of printing can only be determined by a little experience. When printing in bright sunlight, use one thickness of tissue or ground glass over the negative. Print weak negatives in the shade or use several sheets of tissue over the frames.

If prints are not to be developed immediately after printing place them in a tube with a package of preservative and seal the tube carefully.

DEVELOPING.

The developer is simply neutral oxalate of potash and water; three ounces of neutral oxalate of potash dissolved in twelve fluid ounces of water. If tones more on the blue-black are desired, use the following developer: Water, ten ounces; oxalate of potash, one ounce; phosphate of potash, one-half ounce. In preparing developer containing phosphate of potash, always use warm water, as this chemical does not dissolve freely in cold water. Any amount of the developer may be made up and set aside for future use, but should be kept in a well-stoppered bottle. Use sufficient developer to cover the bottom of the tray at least one-half inch deep. Develop prints face up. By sliding prints under developer face up, air-bells are avoided and the development may be closely watched from the start.

Development, as a rule, only requires from twenty to thirty seconds, but it will do no harm to leave a properly exposed print in the developer a full minute. Prints from strong negatives are very often improved in the half tones by prolonging the development a few seconds. Development should be carried on in a weak light. The temperature of developer must not be below 60° F. Keep up strength of developer by adding fresh stock solution from time to time. A developer which has become overcharged with chemicals from the paper will produce poor results. The development should therefore be watched carefully when using old developer, and if any change is noticed in the quality of prints, a new bath should be tried. Weak, granular prints may result from the use of weak or too cold developer. Rock the tray or stir the developer between the development of prints to prevent markings caused by scum, which forms on the surface of the solution. A print which is known to be slightly under-exposed may be saved by warming the developer to 100° or 110° F. Developer which has been used should not be returned to the bottle of stock solution. Have a separate bottle for old developer and do not allow it to stand in a strong light. When using old developer, pour off the clearing solution carefully, so as not to disturb the sediment which settles to the bottom of bottle.

CLEARING BATH.

As soon as prints are fully developed they are placed face down, directly into a clearing bath of muriatic acid and water; one ounce of muriatic acid C. P., to sixty ounces of water. The quality of acid used is of much importance. It should be chemically pure, as ordinary commercial acid will cause yellow prints. Prints should have from three to four changes of acid clearing bath, allowing them to remain in each bath eight to ten

minutes and keeping them separated. The last acid bath should be as clear as pure water, showing no yellow tint. This clearing of prints is very important as permanent results depend on removing all the unacted-on chemicals from the paper. A properly treated platinum print consists of nothing but metallic platinum and paper. After clearing, prints are washed about one-half hour in running water. If not convenient to wash prints in running water, give them eight to ten changes in a tray, separating them well each change.

NOTE.

The following are the most important points in connection with the manipulation of Platinum paper and should receive careful attention.

Keep paper dry at all times.

When placing paper on negatives or examining prints, do not expose to strong light; weak daylight or gaslight will answer.

Keep up strength of developer, and do not use it too cold.

Slide prints under developer, face up, to prevent the formation of air bells.

Place prints directly from the developer into the acid clearing bath without previous washing.

See that clearing of prints is thorough. The last clearing bath should be free from any yellowness.

Use chemically pure muriatic acid for clearing bath.

If developer crystalizes on surface of prints, causing numerous fine, dark spots to appear during development, reduce the strength of solution by adding from one to two ounces of water to twelve ounces of developer.

Enlarging on Bromide Paper.

The amateur who has learned to properly develop his negative will find little difficulty in the handling of Bromide paper. There is nothing complicated in the enlarging process; development is simple and easy.

Bromide paper, unlike the comparatively slow printing-out papers, cannot be handled in daylight, but must be as strictly guarded from white light as a film or glass plate. In nature it is similar, in fact, to films or plates, as the image appears only with development.

A very convenient apparatus for making enlargements from amateur negatives is the Kodak Enlarging Camera, but almost any other camera can be pressed into service as an *Enlarging Camera*, and play a part for which in the first place it was not intended.

The process is so very simple and so inexpensive that we anticipate a great popularity for it. All that is required is a small room with a window, preferably facing the north, through which the light can come without being obstructed by any building or trees. All light should be excluded by means of a wooden shutter to fit the window frame (brown paper answers equally well, secured by drawing pins). In this shutter an opening should be cut somewhat larger than the negatives to be enlarged from. On either side of the opening arrange grooves in which to slide the negative. If the enlarger is so fortunate as to have a room with a window high enough to escape surrounding objects and have a sky back-ground, it will not be necessary to use a reflecting mirror; should, however, the window not look directly upon the sky, a mirror 30 inches long by 24 inches wide, at an angle of 45°, should be arranged outside the window so as to throw the light above on to the ground glass, of which we speak below.

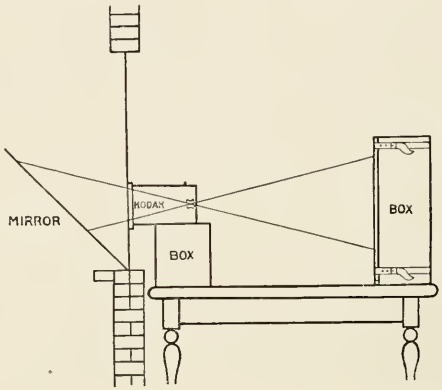
If a film negative is to be enlarged from, it must be placed between a piece of ground glass and a piece of plain glass, the ground surface being on the outside and the film side of the negative being next to the plain piece of glass. The negative should then be placed in position with the ground glass next to the light. The negative should be inserted upside down, thereby giving an upright image on the screen.

Folding cameras, having an opening the full size of the negatives they make, are especially adapted to use as enlarging cameras. Simply place the back of the camera to the opening containing the negative (first, of

course, removing the ground glass, etc., from the camera,) and focus by moving the lens back and forth in the usual way. The Cartridge Kodaks are especially adapted to use in this way.

On a table or shelf, adjusted below the opening in the window, place your camera, having first removed the roll-holder part, so as to leave the back quite open. The camera should be placed in such a position that the back of it covers the negative and with lens pointing toward the easel.

The only other article now required is a support for carrying the sensitive paper during the exposure. If an easel capable of being placed perfectly perpendicular is at hand, that will best answer the purpose, but an ordinary drawing board strapped to a box of suitable size and placed upon the table will answer very well.



Having covered this drawing board with a sheet of white paper, open the shutter of the camera as directed for time exposures, when you will see the image of the negative projected upon the paper. The easel will have to be moved until the enlargement is of the desired size, and the focusing done on the plain sheet of paper by moving the camera backward and forward, or by using the focusing arrangement. Focus with the full aperture of the lens, but before exposure place the second or third stop in position.

The only light that should now enter the room should be that passing through the negative and through the lens. Should any light escape between the camera and the opening in shutter, a focusing cloth can be thrown over to keep it out.

Everything is now ready to make the exposure, and having secured a sharp image of the proper size, place the cap upon the lens, or throw a focusing cloth over it to exclude all light, and then on the plain paper used

to focus upon, place the sensitive paper by pinning the corners to the board, care being taken that the paper is lying flat.

NOTE: The No. 2 Bulls-Eye, the No. 2 Bullet, No 2 Bulls Eye Special, No. 2 Bullet Special and Folding Pocket Kodaks will make perfect enlargements, but the focusing must be done by moving the camera itself backward and forward, thus requiring a little more care and trouble in perfecting an arrangement which will be perfectly light tight.

No hard and fast line can be laid down as to the correct time of exposure, as the light is constantly changing, so it is advisable for a beginner to make a test exposure upon a narrow strip of the paper he proposes to use, placed diagonally across the focused image. Having covered up three-fourths of this strip, remove the cap from the lens and give an exposure of one-half minute, then uncover another fourth, which will leave half the strip exposed, and give another half minute's exposure. Repeat the operation with the remaining two-fourths and then replace the cap on the lens. It will be evident that this test strip has now received four different exposures. The first fourth exposure has now had two minutes, the second one and a half, the third one, and the last portion 30 seconds. Upon developing this strip it is easy to judge which, or between which, of these exposures is correct.

It will be a very dense negative that will require an exposure exceeding two minutes, and a very thin one that will need less than 30 seconds, if any of Eastman's Permanent Bromide Papers are used.

Having ascertained the time necessary, pin a piece of the Bromide paper of the desired size to the face of the easel, being careful to have it lie perfectly flat. Open the lens and give the proper exposure. Close the lens. The enlargement is now ready for development as described on page 133.

The time of exposure required in making an enlargement on Bromide paper is necessarily uncertain, especially when daylight is used, and is dependent on many circumstances.

1. The intensity of the light.
2. The strength or density of the negative.
3. The size of the enlarged picture.
4. The size of the camera.
5. The size of diaphragm or stop used in the lens.
6. The Bromide paper used.

The amateur must not be appalled by this seemingly formidable array of conditions, and need not for a minute despair of ever judging correctly in every instance.

While it is true that in order to obtain the very finest results, a knowledge of all these is necessary—and such a knowledge as can only come to one by careful observation and practical experience—perfectly satisfactory pictures can be made by the beginner. A very few trials will narrow the exercise of judgment down to the intensity of the light.

VIGNETTING. The operator, standing at the left of and half-facing the easel, should screen the lens with a piece of straw-board about 16 x 20 inches, having a hole of proper shape for the vignette cut in the center. Having uncapped the lens the vignetter should be moved back and forth from the lens towards the easel so as to allow the head and shoulders of the image to appear on the screen. The movement out should be sufficient to show the image almost to the edge of the kit, and in far enough to cut close to the head and shoulders. This movement to and fro should continue through the entire exposure, which should not be less than twenty or thirty seconds, the lens being stopped down, if necessary, to get sufficient time to operate the vignetter.

To get a soft, evenly blended vignette requires some little practice, but the knack once acquired it becomes quite easy.

EXTRA PRINTING. Faces and light drapery often require, to get detail, extra time in exposure. This is accomplished by using a card having a smaller aperture after using the vignetting card, and passing it over the portions requiring the extra time. By keeping the spot of light moving almost any amount of additional detail may be obtained locally. Occasionally in a half or full length subject, a hand may require *less* exposure than the rest of the picture ; in this case a small piece of cardboard, cut to the proper shape and stuck on the end of a knitting needle, can be used to screen that part of the image.

The paper lends itself to innumerable dodges which may be practiced in a similar manner, the operator being able to see just what he is doing from his position near the easel.

SOFT EFFECTS IN ENLARGEMENTS.

Wonderful softness and breadth can be obtained in enlarging on Royal Bromide paper by making the enlargement *through a silk bolting cloth screen.* The screen breaks up the intensity of the blacks, adds to the breadth of the half tones and when prints so made are given a sepia tone as described on page 140 they have the appearance of rare old etchings. The screen can be most conveniently used by stretching on a strainer or frame.

The screen may be used in direct contact with the paper, in which case the enlargement has the effect of being made on fine meshed canvas, or greater diffusion of light may be given by placing the screen at a distance of about ¼ inch from the paper ; the farther the screen is removed, the greater the diffusion of light. The use of the screen increases the length of exposure about one-third.

With "smooth" paper the fine mesh or medium bolting cloth should be used. With "rough" paper use coarse mesh.

Silk bolting cloth for this purpose can be obtained at any Kodak dealer's.

DEVELOPMENT.

Having made the exposure, the next step is to develop the picture. The process being much the same as in the development of a negative, most of the articles required will be already in the outfit of the amateur who does his own developing and printing.

DEKKO DEVELOPER.

Provide the following articles:

1 Eastman Orange Candle Lamp,
1 Glass Graduate,
1 doz. Eastman's Dekko Developer Powders,
1 oz. Bromide Potassium,
1 lb. Hyposulphite Soda,
1 Stirring Rod,
3 Hard Rubber or Rubber-Lined Trays of sufficient size to contain the largest enlargements which you propose to make.

Any one can make a rubber-lined tray by gluing a piece of gossamer cloth to the inside of a wooden tray of suitable dimensions.

NOTE.—The following directions are for developing a 6½ x 8½ print, but it should be borne in mind that enough of any solution should be used to fully and quickly immerse the print.

1. Fill one of the trays nearly full of water and put the exposures into it one by one, face down; put them in edgewise, to avoid air bells, and immerse them fully.

Cover the tray with a bit of brown paper to keep out the light from the lamp.

2. Open one of the developer powders and put the contents (2 chemicals) into the beaker and pour in 4 ounces of water, (up to the ring with an Eastman beaker). Stir until dissolved with the stirring rod.

3. Take one of the exposures from the water and lay it, face up, in the second tray, and pour upon it the developer. Rock it back and forth to prevent streaks and air bubbles. In about two minutes it will begin to darken in spots, representing the shadows, and in about three minutes the operator will be able to distinguish objects in the picture. The developer should be allowed to act until the picture is of the required depth.

4. Transfer the developed enlargement to the third tray and rinse two or three times with water, leaving it to soak while the next print is being developed.

Four or five 6½ x 8½ pictures can be developed one after the other in one portion of developer, then it should be thrown away and a fresh portion

mixed. If the pictures are larger a proportionately less number can be developed with each fresh batch of developer.

As each successive print is developed it should be put, with the preceding prints, in the washing tray and the water changed twice, to prevent the developer remaining in them from staining them. Then place in the fixing bath.

5. All the exposures having been removed from the first tray, put six tablespoonfuls of the Hyposulphite of Soda into it, fill two-thirds full of water and stir until dissolved. This is called the fixing bath.

6. Immerse the prints one by one in the fixing bath and allow them to remain about ten minutes.

7. The yellow shade can be removed from the lamp as soon as all the exposures have been developed and fixed.

8. After fixing, wash thoroughly for two hours, in at least twelve changes of water, and hang up to dry. The fixing solution must only be used in one tray. Neither must any of the fixing solution be allowed to touch the paper, through the agency of the fingers, or otherwise, until it is ready to go into the fixing bath.

METOL-HYDROCHINON DEVELOPER.

This developer must not be used with Royal Bromide Paper.

Metol,	30 grains.
Hydrochinon,	120 grains.
Sulphite of Soda,	1 oz.
Carbonate of Soda,	¾ oz.
Water,	48 ozs.

When dissolved add 12 grains of Bromide of Potassium, or 100 drops of a solution composed of Bromide of Potassium, 1 oz., water, 10 ozs.

Use cold. After exposure soak the paper in water until limp and brush lightly over the surface while wet with a tuft of cotton and flow developer over the print.

The image should appear slowly, and develop up strong, clear and brilliant. When the shadows are sufficiently black, pour off the developer and rinse the print thoroughly with pure water. If the print has been over-exposed, the quantity of Bromide of Potassium solution should be increased as a restrainer. Immerse prints for ten minutes in the

FIXING BATH.

Hyposulphite of Soda,	3 ounces.
Water,	16 ounces.

While in fixing bath move prints about five or six times to insure even action of hypo.

After fixing, wash thoroughly two hours, in at least twelve changes of water and hang up to dry. Use fresh developer for each batch of prints. With a glass bottomed or rubber lined tray, seven ounces of developer are sufficient for a 25 x 30 print.

NO TONING REQUIRED.

With Bromide Paper the final tones are obtained entirely by development, and range from a soft gray to a rich, velvety black, depending somewhat upon the density of the negative and the quality of the light used for printing.

CLEAN DISHES, CLEAN HANDS.

The faintest trace of Hyposulphite of Soda or of Pyrogallic Acid is fatal to good results with Bromide Paper, and the operator cannot be too careful to avoid any contamination. The tray used for developing should never be used for anything else.

To avoid yellow prints two things are absolutely necessary.

First—Fresh Hypo solution is required for fixing each batch of prints.

Second—The washing must be thorough after fixing.

AMIDOL DEVELOPER.

The following formula is especially recommended for use with the Royal Bromide paper and may, if desired, be used with any of the others.

Directions for using

CONCENTRATED SOLUTION.

The concentrated stock-solution is prepared by dissolving in succession in

Water, - - - - - -	12 ozs.
Sodium Sulphite, Crystal, - - - -	3 "
Amidol, - - - - - -	½ "

Enough of this stock-solution should be prepared at one time for one day's use.

TO DEVELOP.

Take in a suitable tray :

Concentrated Stock-Solution, - - -	1½ ozs.
10 per cent. Solution, Bromide of Potassium,	8 drops
Water, - - - - - -	6 ozs.

Use cold. After exposure, soak the paper in water until limp and brush lightly over the surface while wet with a tuft of cotton; then flood print with the developer.

The image should appear slowly and should develop up, *strong, clear and brilliant.* When the shadows are sufficiently black, pour off the developer and rinse the print thoroughly with pure water. If the print has been over-exposed a small additional quantity of a solution of Bromide of Potassium should be used as a restrainer.

NOTE: The above developer can be used over by the addition from time to time of some fresh developer. If, however, the restrainer solution has been added to it the developer should not be used again except for prints that are known to have been over-exposed.

Fix and wash as before described.

MOUNTING.

MOUNTING ON CARD.—Bromide Prints may be mounted wet or dry; the prints should not be dried between blotters like chloride paper, but should be hung over a line, or laid back down upon glass or clean paper. To mount, brush over the back with thin starch paste, lay the print on the mount and rub into contact with soft cloth.

Prints on Enameled paper may be rolled or burnished or dried on ferrotype plates in same manner as described for Solio on page 114.

For burnishing, the print *must be quite dry*, and a dry lubricator used, Castile soap answering for that purpose.

"C" paper and the Royal Bromide papers are intended to retain their *rough* surface and should not be rolled.

FLEXIBLE PRINTS.—Permanent Bromide prints soaked in a mixture of glycerine five ounces, and water twenty-five ounces, and dried, will not curl, and may be used for book illustrations unmounted. The heavier papers, "B" and "C," are especially adapted for this purpose.

STRAIGHTENING UNMOUNTED PRINTS.—After drying, prints may be straightened by the scraping action of a sharp edged ruler applied to the back; the corner behind the ruler being lifted as the ruler is passed along.

OTHER DEVELOPERS.

Hydrochinon,
Eikonogen,
Para-Amidophenol.

Any of the above may be used to develop *Eastman's Bromide Papers*, formulas for the use of which accompany the chemicals.

CONTACT PRINTING

WITH PERMANENT BROMIDE PAPER.

LIGHT.—In contact printing with *Bromide Paper*, the exposure is preferably made by artificial light to insure uniformity, and to avoid over-exposure. Place the paper in a printing frame in the same manner as when using Solio or other printing-out papers.

SENSITIVENESS.—*Bromide Paper* is about one-twentieth as sensitive as a good dry plate or film and should be exposed accordingly.

EXPOSURE.—The exposure varies with the intensity of the negative, and the quality and intensity of the light, but may be approximately stated to be, using as thin a glass or transparent film negative as will make a good print, one-quarter second by diffused daylight, or ten seconds at a distance of one foot from a number two kerosene burner. Very thin negatives should be printed by weak yellow light, like that obtained from a kerosene lamp turned down a little below the normal intensity. In this way a strong, vigorous print may be obtained from a negative that would otherwise be too thin and flat. Strong, intense negatives are best printed by daylight.

DEVELOPMENT.—Same as enlarged prints.

HINTS.

Mealy Mottled Prints—Over-exposure and short development.

Greenish Tones are obtained by over-exposure and too much bromide.

Face of Permanent Bromide Paper can always be distinguished by its curling in. Convex side is always the back.

Fixing—The operator can tell when a bromide print is fixed by looking through it or upon it in a good light ; unfixed portions will be a greenish yellow.

Yellow Prints—Prolonged development will cause yellow prints. The exposure must be correct so as to allow of quick development.

Forcing Development does not give good results for the above reason.

Running Water is not so sure a means for washing prints as changing them from one tray to another, allowing them to soak at least ten minutes in each fresh water ; twelve changes are sufficient ; no less.

Retouching Negatives—Coarse grinding for retouching should be avoided and the retouching "burned in" to the varnish over a spirit lamp to avoid having the scratches show in the enlargement.

DON'T.

Don't use old hypo for fixing.

Don't use the developing dish for fixing.

Don't put the prints between blotters to dry, unless they have been five minutes in a solution of alum, 4 ounces.; Water, 1 quart.

Don't fail to rock the tray well while developing.

Don't rock in one direction only, unless you want streaky prints.

Don't let a jet of water play on the paper while washing ; it will cause blisters.

Don't use old developer on large prints for the sake of economy ; use it fresh every time.

Don't say you can't work Bromide paper because you fail to get a good result the first time. Perseverance in all things.

Don't expect that the light reflected from a red brick wall will be sufficient for enlarging. Unless your enlarging window has an unbroken horizon use a reflector.

Don't suppose that a Permanent Bromide print is liable to *fade* because the paper turns yellow. All paper will become yellow after exposure to light and air. For example, see any old engraving or etching. This yellowing or mellowing of the paper has nothing whatever to do with fading.

WHAT PAPER TO USE.

ROYAL BROMIDE PAPER

is particularly recommended for use where 14 x 17 or larger prints are to be made. When enlarged through bolting cloth and sepia toned, prints on this paper have the breadth and softness of rare old etchings. This paper is not adapted for use when vignetted prints are wanted, but gives a richness obtainable on no other paper when used with negatives having dark, sketchy backgrounds, deep shadows and snappy high lights. When using bolting cloth screen, the time of exposure should be increased about one-third.

STANDARD BROMIDE PAPER

is a natural surface Bromide paper, which is especially adapted to all kinds of enlargements, particularly copies on which crayon or pastel work is to be done.

The emulsion is coated on three different weights of paper—A, thin smooth—B, heavy smooth—C, heavy rough.

PLATINO-BROMIDE PAPER.

Platino-Bromide is a new argentic bromide paper, giving soft, rich effects, velvety blacks, absolutely pure whites, and having a dead surface like platinum. Unlike platinum paper, however, it will keep before and after exposure, and can be printed by lamplight. Pictures made on it *are permanent* as the paper itself.

ENAMELED BROMIDE PAPER.

Prints on Enameled Bromide paper when untoned combine the soft effects of a platinum or bromide tone with a highly enameled surface. This paper has a slightly pink tint which especially commends itself to those who object to the coldness of an ordinary bromide tone.

Prints on enameled Bromide paper when toned with the hypo toning bath given further on, and dried on ferrotype plates, are in no wise inferior to the best aristo prints in richness of tone and depth of detail and gloss, hence enlargements made in this way from good negatives are fully equal to contact prints and require no finishing.

MATTE-ENAMEL BROMIDE PAPER.

This paper combines the brilliancy of an enameled paper with rich carbon blacks. Like the enameled, it is lent warmth by its slightly pink tint and is capable of taking a beautiful sepia tone.

SEPIA TONES WITH ROYAL BROMIDE, ENAMELED, MATTE-ENAMEL, OR PLATINO BROMIDE PAPER.

By using the following formula rich brown and sepia tones can be readily obtained with prints on Royal, Enameled, Matte-Enamel or Platino Bromide paper after they have been developed and fixed. The tones produced are permanent and not subject to the bronzing in the shadows which occur in bromides toned in Uranium.

FORMULA.

Hyposulphite of Soda, - - - - - - -	20 ozs.
Ground Alum, - - - - - - - -	4 ozs.
Hot Water, - - - - - - - - -	2 gals.

Dissolve the Hypo in the water first, then add the alum slowly ; when all is dissolved the solution should be milk white. Allow it to settle, then decant the clear solution and use cold.

TO TONE.

After prints are developed and fixed wash in three or four changes of water and then immerse in the cold toning bath, being careful to remove all air bells. The print or prints should be handled over occasionally during the first four or five hours and may then be left in the bath over night or until the desired tone is acquired.

After toning wash thoroughly two hours and hang up to dry.

DETAILS.

Be sure and fix thoroughly before toning.

Prints should be toned face up.

Solution may be used repeatedly by adding fresh bath occasionally.

A number of prints can be toned in the same bath at the same time.

Spots or unevenness in the tone will disappear if print is left in the bath and occasionally moved.

The toning takes from 15 to 20 hours.

SEPIA TONES WITH VELOX RE-DEVELOPING SOLUTION.

Bromide enlargements may be toned with Velox Re-Developing solution. Prints on Matte-Enamel or Platino Bromide paper attain a much better color with this method than with the Hypo Alum bath. Prints on Royal Bromide toned in this way are considerably warmer in color than when toned in the Hypo Alum bath. Bromide prints should be handled in the same manner as described for Velox on page 104.

GLOSSY PRINTS WITHOUT A BURNISHER.

Beautiful glossy prints may be made on Enameled Bromide paper by following directions given for using Ferrotype plates with Solio paper on page 114.

ANOTHER METHOD.

A fine gloss may be given Enameled Bromide Prints by coating the mounted print with a solution of gum arabic 1 oz., water 4 ozs.; filter through chamois skin each time before using. Apply smoothly with a camel's hair brush. If too thick to spread smoothly, thin with water to proper consistency.

CLEANING THE PRINTS.

The surface of Enameled Bromide Paper is extremely delicate and liable to abrasion, which shows in hair-like lines like pencil marks after development. Fortunately they can be easily removed from the *dry print* before mounting by rubbing with a tuft of wet cotton.

Making Lantern Slides.

There is no pleasanter part of the art photographic than the making of lantern slides. Permanent Bromide lantern slide plates are coated with an emulsion similar to that used on Bromide paper and are developed in exactly the same manner. Lantern slides can be made by contact printing from 3¼ x 4¼ or smaller negatives, and from 4 x 5 negatives, except when it is necessary to retain everything shown clear up to the edges of the original negative. From larger negatives the lantern slides are made by reduction, a process similar to that of enlarging except that the Bromide slide plate must be nearer the lens than the negative—the reverse of the enlarging process where the further from the lens the paper is, the greater the enlargement. By either the contact or enlarging process the operation of slide making is very simple. If the operator is provided with a developing and printing outfit, the only extras required for contact printing will be

1 doz. Permanent Bromide Transparency Plates.
1 doz. Cover Glasses with Masks.

TO PREPARE THE NEGATIVES.

Take a negative and fasten it in position over the paper mask by means of a bit of gummed paper, and lay the mask with the negative on the clean glass plate in the printing frame with the *negative* between the mask and the glass. Lay one of the plates coated side down, on the negative in the frame, fasten the back of frame and expose the same as described for bromide paper on page 137.

DEVELOPING THE SLIDE.

Take the plate out of the frame and lay it on one of the trays, and cover it with either of the developers recommended for bromide paper on pages 133 to 136.

The image will appear in a few seconds. The development should be continued until the black parts begin to get opaque by transmitted light, or about one or two minutes, then the developer should be poured off and the plate flooded with clean, cold water. After rinsing it three or four times it should be put into another tray and covered with the

FIXING BATH.

Hypo-sulphite Soda, - - - - - - -	4 ozs.
Water, - - - - - - - - - - -	16 ozs.

This should be allowed to act for five minutes, or until the plate is clear and free from milkiness. Then the plate should be soaked in four changes clean water for twenty minutes and stood upon edge to dry, when it will be ready for mounting.

NOTES.—The only experience needed to make good lantern slides by this process, is to learn just how long to expose in the printing frame. Negatives vary somewhat in density, and the time given in the directions is for the average density. Thicker negatives require more, and thinner less time. Enough time must be given for the light to strike through all but the densest parts of the negatives. A few trials with a good slide for a guide will enable the learner to judge correctly what time to give the different negatives. The developer should be used fresh mixed for each slide. Enough of the fixing bath should be used to fill the tray half full; it should be thrown away at the end of the evening's operations.

MOUNTING THE SLIDE.

When dry, lay the slide face down on one side of the prepared covers having the mask on it, so as to have it come between the glasses. Then moisten the gummed edges and fold them over the slide.

PREPARED COVER GLASSES.

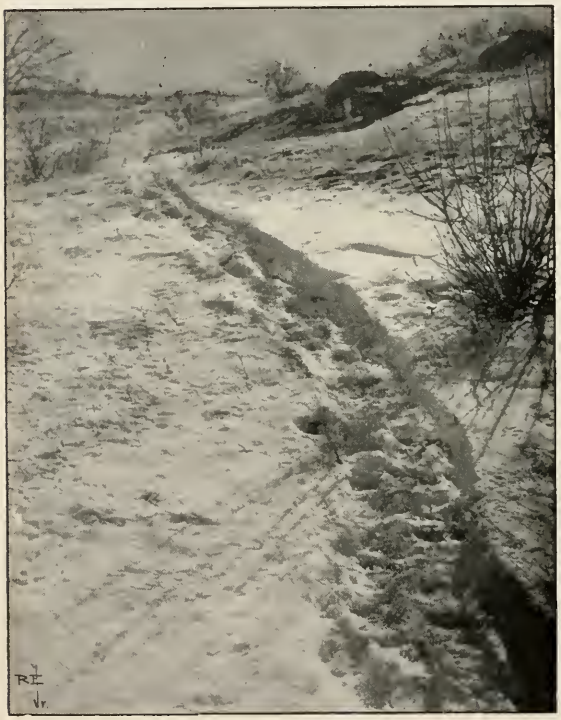
Eastman's prepared cover glasses have mats and gummed binders attached, and will be found a great convenience.

Some Practical Hints on Winter Photography.

BY RUDOLF EICKEMEYER, JR.

Serving as judge at the various photographic exhibitions and competitions—as it has quite often been my lot—it has always excited my wonder; why the majority of amateurs so utterly fail to comprehend the beauties of a season which has always seemed the loveliest one to me.

No other season lends itself so well to pictorial interpretations as that of the "inverted year." In the months of spring the scenes of nature are so tender and fragile, that they nearly always elude the grasp of the camera. Who for instance has ever succeeded in giving a true depiction of the burst of tree blossoms in early spring? Summer with its heavy foliage, its dense light and shadow has proven a despair to many a pictorialist. And autumn with its intense coloring cannot be recorded accurately as its charm depends too much on color values, which are exceedingly difficult to render in toned gradations.



The Path thro' the Sheep Pasture. RUDOLF EICKEMEYER, JR.
By courtesy of Harper & Brothers. Copyright 1903, by Harper & Brothers.

Also the sterner aspects of nature, rain and storm in their manifold phases and varia-

tions can only under rare circumstances be successfully treated during these seasons.

But in winter every difficulty seems to fade away. From the time when the first snowflakes flutter noiselessly to the ground, to the last thaw, when the hepatica timidly blooms amidst patches of melting snow, every wood, every change of atmosphere, every vagary of form which the snow-covered earth is subjected to, can be held by the camera. It is the season for realistic interpretations.

True realism always enhances the pictorial and aesthetic qualities as well, and by aesthetic interpretations I mean a combination of all those elements which change the ordinary photograph into a revelation of pictorial beauty.

Golden Rod. RUDOLF EICKEMEYER, JR.

By courtesy of Harper & Brothers. Copyright 1903, by Harper & Brothers.

In winter, nature appears to the experienced eye like a delightful composition in monochrome. The whole gamut of tones is there, from purest white to deepest black, imperceptibly blended into each other, even those where the contrasts are strongest. And it is for this reason that the rendering of winter scenes, in my opinion, can be handled with equal skill and success by the photographer as by the colorist, or the illustrator who uses black and white as a medium.

The fault of amateurs, on the whole, is that they strive too much for extraordinary effects, they insist on strange snow formations and queerly shaped icicles, and depict rather the idiosyncrasies than the poetical moods of winter.

And yet beauty is lurking everywhere in all of winter's multitudinous phases. Nearly all my pictures were taken in the vicinity of my own home.

The simplest scene, when the ground is only covered by a light snowfall, has its intrinsic pictorial value. The white snow cover blends everything into a perfect harmony. Look for instance at the path through the sheep pasture after the first snowfall. You hardly recognize the old familiar scenes. And yet every detail has been preserved. The snow has fallen evenly all over the landscape and not obliterated a single feature. Every undulation can be traced, but everything is softened, as seen through a veil. The twigs and branches are still bare, but even while deprived of all their emerald glow, they are not lacking in beauty, and their structural forms are now seen to their best advantage and the long exaggerated silhouettes of their shadows lend a peculiar weird and primitive character to the scene.

The Shadows of the Trees. RUDOLF EICKEMEYER, JR.

By courtesy of Harper & Brothers. Copyright 1903, by Harper & Brothers.

Those who are fond of broad effects, will find ample material after a heavy snowfall. As soon as the snow is deep, all details practically vanish and everything is seen in masses, which enable the pictorialist to suggest desolation and immensity more easily than through any other medium.

Some of my most successful pictures have been taken in heavy snow storms, and under very trying circumstances. More than once I have been obliged to brush the snow flakes out of the lens before setting the shutter and drawing the slide. But all these little inconveniences turn into a delight if we consider how favorable the conditions really are for making a good negative. The luminosity of the atmosphere is remarkable. Even to one experienced in such matters I find it a new source of wonder each time I venture out on a snowy winter's day. The whole landscape may be

obscured by snow flakes and the sun invisible and yet it is possible to take snapshots, even with a lens of moderate speed.

But for the amateur in quest of pictorial beauties it is not absolutely necessary to brave the inclemency of the winter's storms. The play of sunlight, of the winter landscape, and these efforts can be studied on a quiet day when it is only moderately cold.

How clear every stem and stalk is outlined against the snow. Never was there a greater opportunity to study the structural forms of trees and shrubbery. Everything seems to be crowded with detail, even the simplest weeds gain a pictorial significance, and the golden rod, mere fragments of their former beauty, charm every student of nature by their white, flowery appearance.

My Garden. RUDOLF EICKEMEYER, JR.

By courtesy of Harper & Brothers. Copyright 1903, by Harper & Brothers.

What is most necessary to make a successful picture is to select a view which does not embrace too wide a field, and so run the chance of being over-crowded with detail.

"The Shadows of the Trees" depicts a favorite spot near my home. It is beautiful at all times of the year, but never more so than in winter. And it is during the late afternoon hours when it is seen to the best advantage. The picturesque formations of snow at the edge of the brook, the slanting shadows, and the cluster of the trees in the distance, with the reflection in the water, would appeal to every nature lover.

I show this picture to impress the reader with the fact that in winter, as in the other seasons, there is a time of day when a landscape appears at its best, and to successfully interpret it one should be there at that time.

Beautiful things can be found even at one's very door. I only need to

step into my garden. Even there the activity of winter has been in full play, and changed it into a fairy land. Each branch is encased in a sheet of pure crystal, which glows and glistens in the early morning sun.

Skies are usually one of the greatest difficulties the beginner has to encounter and are usually lost in developing, in the effort to bring out the rest of the landscape. In his winter negatives, however, he will be generally agreeably surprised at the truthful rendering of his skies. This is easy enough to explain. In summer, on account of increased actinic activity, the sky requires only a fraction of the exposure which the foreground and objects demand. But in winter, sky and snow are for all practical purposes of the same actinic quality, and their relative values are therefore comparatively easy to express.

As to the technical methods to be pursued in snow photography, a few words will be gladly accepted by all beginners. The first qualification is to be comfortably clothed. My attire is such that I can, if necessary, go into the wet places and come home dry shod. My camera is 8 x 10 in size, which I have used with admirable success, always with a tripod. The camera, plate holder and tripod are of leather, to protect them from moisture. As an additional safeguard, the plate holders are encased in felt covers. Occasionally I have made use of a No. 3 Kodak, and found it a very handy instrument, especially in stormy weather ; the results were all that could be desired, and were it not that my photographs are largely for exhibition and book and magazine illustrations, I should not burden myself with any other apparatus. It answers all practical purposes, and is capable of producing any effect possible with a larger camera.

I have found the films backed with paper a decided advantage, especially when photographing toward the sun.

I am frequently asked what developer I use to produce my effects. My developer is a simple Pyro-Soda solution. In nine out of ten cases when a negative is faulty, it is not the fault of the developer. It is generally a case of under-exposure or the fact that the plate has been overexposed and not carried far enough in development. I have also used one-solution developers, and after becoming acquainted with their peculiarities, have found them practically as good as the one I am in the habit of using. School yourself to time your exposures properly, then your normal developer will give you good results.

But I cannot repeat often enough. Don't imagine that everything depends on the lens or developer. Remember what Emerson, the Father of Pictorial Photography, has so pertinently said, "that we were born blind and we must educate ourselves to see." I am prone to believe that he has uttered a great truth in these simple words. Among the thousands of photographs that have passed through my hands, I have seen many that

failed in becoming good compositions, merely because the photographer had just missed the proper point of view, which would have eliminated some objectionable object. Therefore educate yourselves to *see*, and you will suddenly discover the beauties inherent in the amplest winter scene. And no matter what weather you experience, nor how small the patch of ground may be to which you are confined, you will always find more than ample material to make a good picture.

"*The Brook.*" RUDOLF EICKEMEYER, JR.

By courtesy of Harper & Brothers. Copyright 1903, by Harper & Brothers.

Nature With A Kodak.

BY A. RADCLYFFE DUGMORE.

PART I.

FLOWERS, CUT AND GROWING.

CUT FLOWERS.

Perhaps few branches of photography are more neglected than the picturing of cut flowers. Why it should be so is not easy to say. The difficulties are not so very great and every owner of a Kodak can be sure of success after a little careful experimenting. With a 4 x 5 Kodak, pictures suitable for lantern slides can readily be made. In few ways can the work of the camera be made more delightful than by means of the lantern slide, and certainly flowers better than any other subject lend themselves to slides, especially when they are to be colored. The accessories necessary in photographing cut flowers are, first, several backgrounds of suitable shades ranging from very dark green to white. An absolutely black background is not to be recommended as it makes the contrast too strong. Second, a few well shaped vases for the more slender plants. Third, a flat dish about one or two inches deep, with a few strips of lead, one inch wide and four or five inches long. These bent in zig-zag form can be used to support many kinds of flowers that have fairly rigid stems, by simply pressing the lead against the stem, and allow of very decorative arrangement. It will be found extremely difficult to support such delicate flowers as anemones, and I would advise the use of a piece of glass laid at a slight incline so that the flower will rest on it. Then the camera may be tipped until at right angles to the glass. The background can be placed at a distance of not less than 18 inches back of the flowers. Very dark backgrounds will show reflections cast on the glass, so they cannot be recommended. Should you wish a dark effect it may be procured by using a fairly light non-actinic color such as orange. In selecting backgrounds be sure they are free from noticeable texture so far as possible, and to render them still softer in quality place them at considerable distance from the subject, that is, entirely out of focus, remembering that the further they are from the subject upon which the camera is focused, the darker they will appear in the picture.

The ray filter or color screen is occasionally advisable even with films which have orthochromatic qualities. Probably no part of the amateur's outfit is less understood than the ray filter, so let me say that when photographing an orange flower with dark green leaves, the filter is absolutely unnecessary ; it simply prolongs the exposure without accomplishing anything, but when the subject is a white flower of delicate form and texture with dark leaves, then use the lemon colored filter in order to hold back the white, which would otherwise be over-exposed if the green leaves secured their correct exposure ; in other words, only use the ray filter when there are extreme differences in color. Blue flowers will appear lighter than they really are unless the color screen is used. In placing the flowers do not be afraid of trying different effects of light. Even sunlight may be used at times with pleasing results. White flowers should seldom have the light from the direction of the camera, whereas rich red or orange ones need all the light they can get. Bear in mind that flowers of nearly all kinds tremble at the least movement of air or vibration, so stand absolutely still during the exposure and have all the windows closed. These precautions will save many failures. In gathering wild flowers for photographic use place them in a cool cellar over night either in water or in a box containing wet cloth or paper, and cover with some wet material which should not be in contact with the flowers. Don't use cotton batting, as small particles adhere to the plants and show with startling clearness in the picture.

KODAK. A. RADCLYFFE DUGMORE.

GROWING FLOWERS.

In order to be successful in photographing growing flowers, it is absolutely essential to choose only days when there is no wind. The slightest breeze makes the work unsatisfactory, if not impossible. Clear sunlight or cloudy days are both good for the work, the latter giving in most cases the best results. In nearly all cases where growing flowers are to be photographed, it is necessary to use a small diaphragm, owing to the nearness of the subject and to the fact that so great a range has to be in focus. This particularly applies to flowers growing near the ground, such as violets, hepatica, anemones, etc.

Any ordinary good lens will answer for this work almost as well as the newest lens of wonderful speed. Depth of focus is what is wanted, and the more rapid the lens the less its depth of focus, so that it has to be stopped down until it works at the same speed as the cheaper lens. This fact is mentioned simply because the writer has been frequently asked "Whether pictures of growing flowers can be made with the regular lens supplied with the Kodaks." Snap shots at growing flowers are usually out of the question, a time exposure being necessary in nearly every case, therefore it will be seen that for this branch of work the tripod is necessary to support the camera, or it may be advisable to use stones or other convenient support so that the lens will be about level with the middle of the plant. In cases of this kind it may be found desirable to employ a background. For this purpose use a roll of gray cloth supported by two sticks, which may be gathered when needed, or better still have two light rods fitted with metal points. It is occasionally necessary to accentuate the fact that the flower is near the ground, as in the case of the trailing arbutus. For this purpose an acorn or chestnut placed in an unobtrusive position will answer, and the picture will give the correct idea of the flower's form of growth, which, after all, is the object in photographing flowers *in situ*. Large plants will be found easier to photograph than small ones, as the camera does not have to be so near, and consequently the depth of the focus is greater.

PART II.

BIRDS.

With the growing interests in birds, there is the desire by many camera owners to go in for bird photography, and we see the results of this fascinating work throughout the country. For the beginner I would not advise

launching directly into photographing the wild birds, but start at the easiest part, which is the nest, first without the young birds, and gradually work up to taking the parent birds feeding their young in the nest, and so on from that to picturing the adult birds in their wild state away from the nest. The road is a long one and will require great patience and perseverance. These few hints are the result of many years of really hard work on the part of the writer, and are offered with the hope that they may shorten the beginner's road of experience.

THE NEST.

For nest photography a tripod is in nearly all cases necessary, otherwise you have under-exposed films through trying to make snap shots when a time exposure is demanded. In selecting your point of view, place the camera so that if possible the eggs are just visible. Do not, however, move the eggs to suit your convenience, and do not try to get a full view of every egg and all the nest. Let the photograph show decidedly the environments of the nest, even if you have to introduce something to accentuate it. Just as with the low growing flowers, the fact that a ground nest is on the ground is made evident by the introduction of a chestnut burr or some such object. If the nest is in a very low bush, perhaps within twelve or fourteen inches of the ground, then a daisy (if the nest is in the open) will make this fact clear. Avoid cutting away vegetation about the nest, as it will expose it to possible thieves as well as the elements. Bend such twigs as are in your way. When the nest to be photographed is above the reach of a tripod you may find it necessary to secure the camera to a branch, to do which a ball and socket clamp device is most convenient. We frequently find nests placed towards the outward end of a branch just beyond the height of the camera. If the branch is not too stiff it may be drawn down by means of a cord, but as this has the effect of tilting the nest to an unnatural angle, it is well to prop up the branch with a forked stick placed between the nest and where the cord is fastened. Always be careful to notice whether the wind sways the branch containing the nest. If it does, secure the branch in one position, either by cord or prop, before focusing. To make a successful picture of a ground nest, let the camera be very near the ground, within a foot if necessary.

NESTS CONTAINING YOUNG BIRDS.

From the nest with its motionless contents of eggs, we turn to portraying the fledglings, and here we have a suggestion of what troubles are before us. The constant movement of the young birds (due to their rapid respiration) makes it necessary to give a very short exposure. This sounds

easy enough until you realize that nests are usually in well shaded places where even with the lens wide open a time exposure would be needed. It does not do to bend back the surrounding foliage in order to admit sunlight, because the young birds cannot endure the heat of the sun, and even though they are half grown they would scamper out of the nest, and frequently refuse to remain in it after being replaced, with the result that they would probably die. Have everything entirely ready, then at the moment of making the exposure, try to get some light on the nest by bending back the overshading twigs for just an instant. By using white cloth reflectors beneath the nests the dense shadows may be somewhat softened. If you find you can get enough light to allow of an instantaneous exposure, it is interesting to photograph the fledglings with their heads raised. This can usually be effected by making a note more or less like the parent bird's, though frequently the mere moving of a twig will be sufficient to cause the youngsters to open their mouths and raise their heads in anticipation of food. Be sure to focus on the birds that are nearest the camera, so they, at least, will be sharply defined.

THE PARENT BIRD ON THE NEST.

Here we have a phase of bird photography in which the actual photographic skill needed is not so very great, that is, there are not great photographic difficulties to overcome, but one's success depends almost entirely upon the will of the bird. Some birds (either individual or species) are afraid of the camera and others are not. Those that are afraid of it will sometimes abandon their young rather than approach the nest while the camera is near. I have devoted a whole week in unsuccessful endeavor to secure a photograph of a towhee on its nest. Even if the camera is carefully concealed with leaves and a long tube used for the shutter, the chance of getting the picture must still depend on the bird's disposition. Taking a bird of average tameness, the easiest way is to still hunt with the camera, approaching very gently and making no certain movements. In this way I have taken a 6½ x 8½ camera on its tripod to within three feet of the bird and secured the picture. Do not attempt to make instantaneous exposures, as they are unnecessary, and even if light is sufficiently clear to allow an exposure of a quarter or half a second, it is better to use a smaller diaphragm and a much longer exposure, because at the click of the shutter the bird will usually move its head. This movement would show in half second exposure, but not in one of say ten seconds. At the moment of taking the picture, attract the bird's attention by holding a handkerchief or some conspicuous object perfectly still in such a position that the bird can see it.

YOUNG AND OLD BIRDS TOGETHER.

It is at this stage in bird photography that one's troubles really begin. And yet to make one success gives so much satisfaction that the cost of failures is easily forgotten. When the young birds are in their nest they are of course entirely dependent upon their parents for food, and the parents, according to their natural instinct, will usually face almost any danger rather than let their young starve (though some individual birds will never visit their nests in the presence of a person or even a camera). Taking advantage of this well known fact, we can usually count on seeing the old and young together about the nest at frequent intervals during the day, but to see them and photograph them are two very different things. The difficulties are many, so many indeed, that only the enthusiast braves them after the first few attempts. Owing to the constant movement of the birds, both old and young, only the shortest exposure may be given, and as the nests are almost always in shaded places, the result is under-exposure. Once the birds have become accustomed to your presence, they will not be easily frightened, and will allow the use of white cloths as reflectors or even as backgrounds, thus avoiding the splotchy black and white backgrounds that one usually sees in bird pictures. Certain writers advocate moving the nest containing the young to a well lighted place where instantaneous exposures can be made. This method would lead to the destruction of so much bird life that under no condition should it be done for the mere pleasure of getting pictures, or by persons not thoroughly conversant with the ways of the birds. Rather than risk injuring the birds, accept the situation as it is, and do the best you can, for there can be no satisfaction in securing even really good pictures if it is done at the cost of the lives of the birds. If you intend to give anything over one-tenth of a second's exposure, it is a good plan to make a clicking noise, rather louder than that made by the shutter, for many seconds before making the actual exposure. By this means the birds will become accustomed to the noise and will not be so apt to make a quick movement when the shutter is released.

BIRDS ON THE WING.

If you would gain the greatest pleasure to be found in nature photography, try coaxing the wild birds on to your hand, and then secure photographs of them. It is not so difficult as it sounds. First, get the birds accustomed to you. Then when the young are about to leave their nests, take one or more on your hand, and you will be surprised how soon the parents will come to feed them. If you are alone, focus your camera on some object about where you expect to place your hand, then at the moment when the bird is in the position you wish, release the shutter by means of a

long rubber tube. In this, as in all other bird photography, the individuality of the bird counts for a great deal. I have always found that chickadees, chipping sparrows and blue winged warblers would always come with a little coaxing, while towhees, chats and Maryland yellow throats and many others have never shown the slightest confidence.

OLD AND YOUNG AWAY FROM THE NEST.

Once the young have left their nest, there are about two days before they learn to fly well enough to keep out of one's reach. This is the ideal time for getting photographs of them, as they are just as dependent on their parents for food as they were while in the nest. The first thing to do is to catch one (or more if you can) of the brood. Let him fly if he wishes until he is tired ; then place him on a suitable twig and after you have your camera ready, call the parents. Sometimes they will come and sometimes they won't, but after they have once come you may make pictures to your heart's content. They will, as I have often seen them, perch on the camera without the slightest fear, even on one's shoulder or hand while in motion. Be sure in arranging the camera to have plenty of room on either side of the youngsters for the adult bird. It is better to have too much than too little room. Make a mark on the twig to show just how much the camera covers, bearing in mind that in feeding the young the bird frequently perches above the twig upon which are her fledglings, if there is any possible perching place.

While you have the young in your power is a good time to make portraits of the parents alone, using the young as the lure, of course. Select a place where there is but little brush and no conspicuous twig except the one on which you have placed the young birds. Then place a twig a few feet away from them, and the chances are that the parent bird in coming with food will stop each time for a moment or so on this perching place. If you would make still more sure of her hesitating, stand or arrange the camera quite near the young birds. This frequently has the effect of preventing the parent bird from coming too readily. Focus the camera on the part of the twig on which she most frequently alights and watch your chance. When I say focus on the twig I mean on a point an inch or so nearer than the twig. This will allow for the size of the bird, whose head will project at least that distance.

BIRDS IN CAPTIVITY.

Strange as it may seem a bird in captivity is seldom an easy subject for the camera ; little less difficult in fact than the bird in its wild state. A pet blue bird which I once owned was absolutely tame and would go to sleep in

my partly-closed hand, and yet after he was six weeks old, I was never able to get a good photograph of the little rascal during the two years that I kept him. After having tried various schemes I think the most satisfactory one (though very far from perfect) is a long cone-shaped cage made of mosquito netting or bobbinnet, the bottom and larger end being of wood. This wooden end is for the background. At the other or smaller end the netting is attached to the lens by means of a tape or rubber band. There must be an opening at one side of the netting so that you can arrange the necessary perch with the twig and manipulate the bird. The whole contrivance can be supported on two wooden horses and placed so that the sun will come from any desired direction.

KODAK.

Cool Comfort. A. RADCLYFFE DUGMORE.

PART III.

ANIMALS.

As a sport, wild animal photography should enjoy a far greater popularity than it does, for anything more exciting than stalking a wild animal with the camera is hard to imagine. Usually it is impossible to approach as near as one wishes to animals in their native haunts, and it is astonishing

how close one needs to be to a deer for instance, with the lens of ordinary focal length, in order to secure an image of appreciable size. Every year hundreds, almost thousands, of Kodak photographs of deer are made, and in nearly every instance the owner of the camera is surprised, often disgusted, at the insignificance of the animal, frequently a magnifying glass being necessary before its whereabouts can be discovered, so the first thing to remember is, not to press the button too soon. Wait until you are near enough to have a picture of the animal. Before going off to the woods

KODAK.

Gray Squirrel. A. RADCLYFFE DUGMORE.

make a few experimental pictures of a calf at different distances and notice the results. Then you will have an idea of what you may expect when photographing a deer. The hand camera telephoto lens can be used when conditions are favorable, that is to say when there is plenty of light, for they are very slow, and instantaneous exposures can only be made under most favorable conditions. Practically speaking, it is not possible to make instantaneous exposures with a telephoto, giving a magnification of more than four diameters. In using a telephoto for hand camera work it is of the utmost importance that the lens should be extremely rapid, nothing slower than *f.* 6.8 being of any real use.

KODAK.

Snapping Turtle. A. RADCLYFFE DUGMORE.

In all wild animal photography, the camera has to be kept in complete readiness, frequently for many hours at a time, sometimes for an entire day, therefore it is advisable to keep the camera sheltered from the sun as much as possible, and as a further precaution, the lens should be capped until you are about to make the exposure. Do not be tempted to make instantaneous exposures of animals in the woods, especially if there is much foliage. Even in winter, when the ground is covered with snow, snap shots in heavily timbered woods are not as a rule satisfactory.

Small animals, such as squirrels, mice, rabbits and others are all interesting subjects for the camera, but to give any idea of the methods employed, would be to give a life history of each animal. Experience alone must be the teacher.

PART IIII.

FISH.

Here we have the easiest branch of nature photography. Beautiful fish pictures can be made by any one having ordinary skill with the Kodak. All that is necessary is an aquarium which may be made in the form of a box with one glass side and a movable glass partition set in grooves of about three, four and six inches from the front glass. This allows you to keep the fish near the front so that it will be in focus. It also prevents the background of vegetation being disturbed by the rapid movements of the fish when it is first placed in the restricted space. This vegetation should, of course, be selected according to the habitat of the fish you wish to photo-

graph, surface fish requiring nothing in the way of accessories, while those that live among the aquatic plants should have plants as accessories.

The aquarium should be white inside, a lining of white oil cloth being about the most satisfactory material, as it reflects a great deal of light and is easily cleaned. Good pictures can only be obtained by using absolutely clear water, having plenty of sunlight, and by keeping the glass clean and dry. The slightest moisture on the glass (due to condensation) will completely spoil the picture. The water in the aquarium must be kept constantly changed or aerated by vegetation, or the fish will die. The temperature of the water also is very important. With fish such as trout, accustomed to cold water, ice should be used so that the temperature will not be over 45 degrees. Avoid handling the fish more than is absolutely necessary. If you have to take them in your hand, grasp them firmly with both hands so that they cannot wriggle, but the better way is to use a small landing net. Place your camera exactly at right angles to the glass, and if you have bright sunlight, give short exposures, $\frac{1}{100}$ of a second being sufficient with an ordinary flat lens, unless the vegetation is very dark.

Simplicity in Composition.

BY ALFRED STIEGLITZ.

The request of the publishers of this book to write for them an article of fifteen hundred words upon Simplicity in Composition, reminds me of the college professor who was accustomed to call upon his students for extempore dissertations upon subjects which he would suddenly propound. Unconscious of the humor of his demand, he one day called upon one of his favorite scholars in the following terms: "Mr. Thompson," he said, "your time will be five minutes and your subject, 'The Immortality of the Soul.'" I, too, can sympathize with the feelings of Mr. Thompson, for the subject of Simplicity in Composition is as difficult and complex as is often the most simple appearing pictorial composition.

The popular conception of a simple pictorial composition is apparently not one in which the elements are reduced to the fewest possible terms, but one in which such elements are so subtly arranged as to impress the beholder so directly and forcibly with the central or dominant idea of the picture that everything else, even though covering a goodly portion of the picture area, is so subordinated as to appear of but little moment. To achieve such a result, presents to the artist a problem which becomes more complex in proportion to the so-called simplicity of the composition. In fact, one can truthfully say that the ratio of difficulty varies directly as the square of the simplicity. Just as in music we find that the simpler the theme, the more thorough must be the knowledge of the musician in order to compose acceptable variations thereon. So, in fact, in every art this rule obtains, and the simpler the apparent result—assuming, of course, that such result is really beautiful—the greater are the care, knowledge and taste required.

The problem that is presented is practically one of elimination. To include all that is necessary for the elucidation of the composition and to exclude *everything* that is unessential to a clear statement of the dominant underlying idea, taxes the abilities of even the best artists to their utmost. I must not be misunderstood to say that every great work of art must necessarily be simple in its composition, for many of the great masterpieces in painting are built up upon very complex geometric lines. In fact, the nature of the composition is largely dependent upon the subject and the manner in which it is intended to be represented. I am now alluding mainly to linear compositions, there being also tonal compositions, mass compositions, color compositions and combinations of all these. This holds true in varying degree in photography as well as in painting. Those

modern pictorial photographs which have attracted so much attention, especially in Europe, because of their composition and tonal treatment, have been subjected in their development to the same influences that have affected the modern painter generally. Their keynote is simplicity in arrangement and the true rendering of tonal values.

The one element absolutely essential in every composition is balance, without which no picture can ever be satisfying. Lacking this, a picture becomes restless and irritating and the beholder turns from it with a sense of relief.

No formula can be drawn up for the simplification of the course of study necessary to an understanding of what constitutes good composition. To a natural taste must be added a careful and understanding study of the best accepted work of all forms of art, old and new. In photography this is even more essential, if possible, than in painting, for the photographer, usually working in monochrome, has not the resource of color upon which the painter can draw. Consequently, the only advice is to study the best pictures in all media—from painting to photography—and to study them again and again, analyze them, steep yourself in them until they unconsciously become part of your esthetic being. Then, if there be any trace of originality within you, you will intuitively adapt what you have thus made a part of yourself, and tinctured by your personality you will evolve that which is called style.

The ultimate result of the before-mentioned elimination will bring us to a representation in which there appears one single, simple object which the average photographer would say was incapable of composition because it stood in no relation to anything else. In this he is woefully mistaken. It first of all stands in relation to the boundary lines of his print; and in the position it occupies, it divides the surface into spaces. This relation constitutes space composition. Next it stands in relation to its background and here ends the problem of aerial composition. Again it must be illuminated from some source of light and this brings in the problem of light and shade or chiaroscuro. Given a single subject, to produce with these elements alone a truly big picture calls for the display of the greatest art. So apparently simple and yet important are the elements that a slight error in any one particular assumes the proportion of a gigantic fault and the whole composition falls to pieces. Herein lies one of the fascinations of Steichen's photographs. In his direct and simple handling of light and shade and spacing there is a subtlety of which even the average photographer is conscious without being able to analyze why. This lack of understanding is often due to all lack of art schooling and above all to his want of proper association. Nothing educates and refines more than proper association.

Taking now our single, simple object and introducing another simple object into the composition, there immediately springs up a more complex sense of relation. The newly introduced object must now be studied not only in its relation to the three factors previously enumerated and to object No. 1, but its relation to each one of the three factors operating upon our first object. This becomes thus a geometric progressive and so *ad infinitum*. The more involved these relations become, the less important are errors in these minor relations—yet should all these relations be harmonious the

The Hand of Man. ALFRED STIEGLITZ.

result, though seemingly simple, is wonderfully fascinating to the nature student of composition. An instance of this can be found in Whistler's "Piano Room".

I have often been told that one of the main characteristicts of my own photographs lay in their simplicity of composition, and "The Hand of Man" is frequently instanced as an example of this quality. As the lines of composition in this picture are anything but simple, I have come to the conclusion that the average person confounds simplicity and directness of subject with the totally different quality of simplicity in composition.

Had "Gossip-Katwyk" been instanced as a picture showing simplicity in composition, it would have been nearer the truth—yet this picture presented to me in its composition one of the hardest nuts I ever tried to crack. Given a homelike, everyday subject presenting familiar objects, the tendency is to cry: How charmingly simple in its composition! Unconscious of the fact that the subject appeals to us and not its linear or even pictorial treatment.

And now I must return to my anecdote with which I began. So complex is the simple subject "Simplicity in Composition" that these stray and random thoughts have not begun even to outline it. There is one piece of

Gossip-Katwyk. ALFRED STIEGLITZ.

simple and direct advice which I wish to iterate and re-iterate—for I believe this is written for one who has mastered the A B C of the technique of photography and is about ready to dive into the mysterious deep of art: Observe the work of recognized artists—I do not mean look at it, but observe it—make it your own. Then study the appearance of nature more closely than ever before—*everywhere*. And there is also one simple and direct warning I would like to give: Avoid books on composition as you would the plague, lest they destroy in your mind all other considerations than the formulæ which they lay down. If you must be taught by others, not being able to teach yourself, seek out a broad-minded teacher, but guard your originality as the one precious possession which may save you from turning out machine-made work.

Clouds and the Landscape.

The subject of clouds in photography is one that, although given some thought by advanced amateurs, has not been given the attention which it deserves. It is not alone an interesting study, but it is necessary that one understand how to produce clouds in his pictures when he is unable to obtain them directly in the negative. Frequently we pick up a landscape; both the composition and lighting are good but there is something lacking in order to give that harmony which is so essential in landscape work. Above the landscape we see a blank white space and a second thought suggests that a cloudy sky would have given a finish to the picture that could be obtained in no other way.

There are two methods of obtaining clouds: First, to photograph the landscape when there are clouds in the sky; second, to obtain the clouds by the printing-in process. Both have their advantages. With the former the great difficulty lies in being able to give an exposure that will allow of obtaining a negative having a sky and foreground of proper relative printing densities. In most cases we expose for detail in the foreground and by so doing we over-expose the sky, and the result is that that portion of the negative is strong or dense and lacks almost entirely in detail. If we expose for the clouds, we under-time the foreground.

Kodoid Plates and N. C. Film are particularly adapted to this class of work because of their orthochromatic qualities, which make it possible to obtain better color values. This results in a negative having more even density. We may also use the color screen, or filter, which in a large degree compensates for the want of agreement between the sensitiveness of film or plate and the sensitiveness of the eye relative to color. The best results, however, are obtained by the combination of Kodoid Plates or N. C. Film and the color screen. Occasionally, even when using orthochromatic film or plates in connection with a color screen, we obtain a dense sky, due to over-exposure and sometimes to over-development. It then becomes necessary to reduce the strength of that portion of the negative if we would obtain detail in our prints.

The following formula for reducing will be found to give very satisfactory results if the instructions are properly carried out:

To 1 oz. of Red Prussiate of Potash add 16 ozs. of water. Dissolve and keep from the light in a tightly corked bottle. Then make a separate

solution composed of 1 oz. of Hypo-Sulphite of Soda to 12 ozs. of water, to be kept in a separate bottle. With the above solutions, a couple of trays, plenty of water and several tufts of absorbent cotton you are prepared to do the work.

After placing 4 ozs. of the Hypo solution in a tray, add about 60 drops, or one teaspoonful of the Potassium solution. This is known as the reducer. If, after a trial, this is found to be too weak, add more of the Potassium; if too strong, add water. After thoroughly washing your film or plate, place it against a sheet of ground glass (sky down) which has been inclined at an angle of 45 degrees, over a tray that will catch the drip, and before a light that will enable you to see through the negative. Now take a tuft of cotton soaked in the solution and gently rub that portion of the negative that you wish to reduce. You should also go over the surface every three or four minutes with a second tuft of cotton kept saturated with clear water in order that the negative reduce evenly. Be sure to keep the reducer off any portion of the negative that you do not wish it to act upon. Watch the action of the solution closely so that it does not go too far. When the negative is reduced to the proper density, place it in running water for an hour or so in order to stop all action of the reducer.

THE PRINTING-IN METHOD.

Before attempting to add clouds to your landscapes by the printing-in process, it would be well to obtain a collection of cloud negatives in order that you may be able to select one that will fit each case, for it must be remembered that the clouded sky needed in each instance depends almost entirely upon the conditions existing at the time the landscape negative was obtained. For instance, should you picture a landscape when the sun is directly back of the camera and then print-in from a negative, the clouds of which have received their illumination from immediately in front of the instrument, you can readily imagine the result, due to cross lights throughout the picture.

Then again, if the landscape is illuminated from the left, see that the clouds in the negative used are illuminated from the same point. Do not combine clouds taken on a sunless, lowry day with a landscape taken when illuminated by the direct rays of the sun, or vice versa.

Cloud negatives that are to be used for printing-in should be thin. They should, however, have sufficient strength to give brilliancy to the print. There are several advantages in using a cloud negative which is more or less transparent, as you can see through it and better judge as to its adjustment over the print to which you propose to add the clouds.

THE NEGATIVE.

When obtaining negatives for printing-in, it is necessary to make very short exposures because if we over-expose, even very slightly, we destroy the delicate contrasts that exist between the high-lights and shadows and thereby flatten the negative. For instance, if we make an exposure of $\frac{1}{50}$ of a second with stop U. S. 8 for an ordinary landscape fully illuminated by the direct rays of the sun, we in most cases properly time the foreground but overtime the sky, destroying its beauty, and for that reason, when exposing for the sky alone, $\frac{1}{50}$ or even $\frac{1}{100}$ of a second with stop U. S. 32 will in most cases give perfect detail.

An exposure thus obtained should be carefully developed, too much contrast avoided and development stopped the moment that full detail appears. You will then have a negative that will print rapidly and give you all the gradations of light and shade that were impressed upon the eye at the time the exposure was made. It would be well to add that if a light color screen is used, it will improve your negative somewhat but will increase the length of the exposure required.

THE PROCESS.

In the first place, it is necessary, when printing the foreground, to obtain a white sky. In order to do so you must mask that portion of the negative in order that the light may not penetrate the film and affect that part of the print underneath it. First, take a sheet of thin strawboard and roughly sketch across its surface (about midway between the top and bottom) a mark to correspond as nearly as possible with the sky line of your negative; then cut your board along this line. Save both halves because you will need them later. Now procure a print frame (containing a sheet of glass) somewhat larger than the negative you are to print from and after locating said negative in the proper position, fasten it to the glass with small stickers, then tack the upper half of the cardboard to the face of the frame so that only that portion of the negative which you wish to print from will show. Now cover the entire face of the frame with tissue paper and you are ready to print. After removing the print from the frame, if you use printing-out paper, you will find a properly printed foreground with a pure, white sky.

Now place your cloud negative in the print-frame and properly locate the print over it, using the lower half of the cardboard to cover up the foreground so that the light will reach the sky only. It should be borne in

mind that the cardboard (which we will call a mask, or vignetter) when tacked on the frame should be raised up from the glass about one-quarter of an inch, so that, when printing, the light will diffuse and not produce a sharp line on your print. When using Velox or Dekko, as the image does not show before development, it will be necessary to mark the paper at the edge in order to tell just where the sky line comes; otherwise you will be unable to properly locate your cloud negative. When using developing papers it would be well to paste two or three thicknesses of tissue paper over your frame.

FIG. I.

TRIM, TRIM, TRIM.

Trim your prints mercilessly. It is safe to say that three pictures out of every four can be improved by a judicious use of the shears. One picture has too much sky, another too much foreground and another one a whole side with nothing in it worth keeping. When a portion of a picture has nothing in it that is interesting or necessary to the balance of the picture

FIG. II.

cut it out. Note, if you please, the improvement made by cutting off the foreground in the accompanying illustration. Left untrimmed, as in Fig. 1, the picture has little to recommend it, but with a snip of the shears we have cut out the flat and uninteresting foreground and have secured a picture of far more than the usual interest and beauty (Fig. 2). Take two cards and experiment with your photographs if you have not the heart to attack them with the shears, laying the cards on them in such a way as to cut out from view what seem to be undesirable parts. An experiment of this kind will soon satisfy you that the shears can be used to advantage.

HELPFUL HINTS.

Don't use your hypo tray for anything but hypo.

Look on your ground glass, not through it.

Keep films, plates and paper in a cool, dry place.

Label your chemical bottles and keep them well stoppered.

Always dust out your plate holders and dust plates well before loading. A speck of dirt on the plate will leave a transparent spot which will in turn leave a black spot on the print.

Film cartridges are dirt as well as light proof and so the film requires no dusting. Dust will, however, sometimes settle on the sections of film in place in the focal plane inside the camera if a long time elapses between winding the film into position and making the exposure. A famous lecturer and photographer overcomes this difficulty when cycling over very dusty roads by not turning the key until he sees a picture he wants to take—a very good idea *provided you don't forget to turn the key.*

Dust on the film *after* exposure does little harm as it cuts off no light.

When in doubt, over-expose. It is easier to restrain than to force development.

Do not develop in warm water as it is likely to cause frilling. The developer should be about 60° Fahr.

A Saturated Solution is one in which the liquid has taken up all of the solid which it will.

USEFUL TABLES.

AVOIRDUPOIS WEIGHT.	LIQUID MEASURE.
27.34 Grains=1 Dram=27.34 Grains.	60 Minims=1 Dram.
16 Drams=1 Ounce=437.5 Grains.	8 Drams=1 ounce.
16 Ounces=1 pound=7000 Grains.	16 Ounces=1 pint.

In purchasing or weighing chemicals it is always safe to use grains as the standard of weight, as they are alike in Avoirdupois, Troy and Apothecaries' tables, while the other terms vary.

Stereoscopic Photography.

The stereoscope is an optical instrument for giving to pictures the appearance of solid form as seen in nature. In other words, it combines in one, through a blending of the rays of light, two pictures taken for the purpose from two points of view. We might say that all objects seen with both eyes are viewed stereoscopically, as each eye sees the subject from different points, but these two views blend as one on the mind's eye. In order to produce pictures that are stereoscopic, we must first have a camera with two lenses placed at from 3 to 3½ inches apart. We can then make two negatives of the same subject, side by side, differing slightly as to point of view just exactly as our two eyes differ as to point of view. Now if we make a print from the negatives at they are obtained in the camera and view them in the stereoscope, they would appear blurred to the eye, because the right eye would view the subject as taken by the lens at the left of the camera and *vice versa*. This is due to the picture being taken upside down. It, therefore, becomes necessary to transpose the views (reverse their position) in order that they appear as if coming from an intermediate point. Thus they impress themselves upon the eye as one and give the idea of solidity and perspective. When making the exposures, be sure that the camera is held level; otherwise the two pictures will not be on the same horizontal plane.

TRANSPOSING NEGATIVES.

If you wish to make a quantity of prints from one set of negatives, it would be advisable to transpose the negatives themselves in order that the prints therefrom be identical. A Stereo Kodak Cutting Guide is furnished with each stereoscopic Kodak. This guide may be used to trim both negatives and prints. If the camera produces negatives three inches or more in width, it would be necessary to trim the prints exactly three inches wide, which with one or two exceptions is the width of a single stereoscopic print. In order to obtain prints which are perfectly stereoscopic, it is first necessary to select some particular point of interest near the center of each negative. For instance, place the film on an easel in contact with a sheet of glass in such a manner that you will be able to view it by transmitted light, the film side toward you. Place the guide on the

right hand negative, the straight edge in the center over some particular point of interest in the middle distance. If margins remain on both sides, trim the negative at the right of the guide. It may then be removed to the left hand negative, the straight edge in the center being placed over the same point of interest as was selected in the right hand exposure. When in this position, trim the negative on the left. The negatives should then be separated and transposed, the cut edges brought together so that they will be even at top and bottom and fastened to a sheet of glass (which will fit in your frame) by means of small stickers. When using glass plates, they may be marked and then cut and transposed the same as films, the two halves being supported upon an extra sheet of glass. The negatives are then in a condition to print from. When printing, it would be advisable to use Solio, Kloro or Glossy Velox, which may be obtained the proper size for ordinary stereoscopic views. If the center of the sheet of paper is placed directly over that point where the films are matched together, after the print has been toned and washed, it may be mounted on the regular 3½ x 7 stereoscopic mount without further trimming.

If only a few sets of prints are to be made from the negatives and you do not care to go to unnecessary trouble, prints may be obtained from the negatives without cutting them and after being toned and dried may be trimmed and transposed. When making prints from the negatives before they are transposed, it would be necessary to mark each print so that there would be no chance of getting them mixed before mounting. To trim prints requires care. The same guide used for trimming the film may be used for the prints by simply selecting the same point of interest in each print and then trimming on both sides. A very slight difference would ruin your picture, so be very particular in locating the guide. Pay no attention to the difference in the appearance of objects at each *side* of the print ; as they will differ owing to the two negatives having been made from different points of view. When trimming the bottom and top of the prints, select some prominent object in the foreground and place the edge of the guide across the bottom of the print, trimming at right angles with the upright line. After the bottoms of both prints have been trimmed at exactly the same point, then trim the top so as to bring the print to the proper size, 3 x 3¼. Prints must be identical in size and must be trimmed by measurement from a common point at or near their centers, otherwise they will not be stereoscopic.

When trimming and transposing Stereo-Brownie* negatives, the above instructions may be followed, but due to the fact that the camera is of different size, the Cutting Guide is a trifle smaller and it is, therefore,

*NOTE.—There is now manufactured in the No. 2 Stereo Brownie size an Automatic Stereo Printing Frame by means of which the prints are transposed with absolute accuracy *without cutting*.

necessary to separate the prints after they have been properly trimmed and mount them $\frac{5}{16}$ of an inch apart in order to obtain the proper stereoscopic effect. This may be easily accomplished by marking the mount in the center and placing each print at an equal distance from it.

For the benefit of those who are not in possession of a Stereo guide we would suggest, as a substitute, a sheet of glass of the proper width with an upright mark drawn through its center.

THE SUBJECT.

In obtaining the best stereoscopic effect, much depends upon the choice of the subject. When all objects in your picture are at a distance, the view appears flat. As we judge distance by perspective, it is necessary to have rather a strong foreground, some figures or a tree or two will answer this purpose nicely. To thoroughly understand this, look at a distant landscape devoid of foreground, first with one eye and then with the other; both appear the same. Now place a figure of some kind directly ahead of you, say 10 feet, then view the same subject with the left eye closed, and you will see more of the view on the right hand side of the figure. Then close the right eye and note the difference. When we bring together in the stereoscope the two views made from different points, we find perspective and solidity of form, just as we do when we view it with both eyes.

The Sensitizing and Use of Plain Papers.

BERNARD ALFIERI.

When I say plain papers I mean, of course, papers without a superficial coating of gelatine or albumen. In the choice of these for salting and sensitizing there is no restriction except that of chemical purity, and no difficulties in manipulation greater than will be met with in any other printing-out process.

Bromide "matt" papers do not come under this heading, since the gelatine surface is only made "matt," or free from glaze, by the use of starch, resin or other admixture in the coating of the paper. Platinotype is a typical example of a "plain" paper, and similar results may be obtained by the use of silver salts instead of platinum, with the additional advantage of a far wider range of color and texture than is possible in that process.

CHOICE OF PAPERS.

Your paper should be chemically pure and particularly free from iron spots (which, when the paper is sensitized, will spread out like asterisks,) and at the same time it should be selected with your ultimate aim as to effect well in view. The purest I have found, next to "Rives," on which platinotype is coated, and for the matter of that most silver papers, too, is Whatman, which is sold in three grades, viz.: H. P., hot pressed or smooth; N., not, and R., rough, and then come Arnold, Harding and Hollingworth, all of which may be obtained from the principal Artists' Colormen without any difficulty and in various sizes. "Royal" measures 24 x 20 in. and Imperial 31 x 22 in.; and costs from 3d. to 6d. a sheet, according to its weight. These sheets can be cut up to the sizes you wish to print, allowing a little margin to handle them by in salting and sensitizing.

SALTING AND SIZING.

Having decided upon the paper you wish to use, a salting bath is made up as follows:

Common Salt,	50 to 100 grains.
Gelatine,	10 grains.
Water,	10 ounces.

But this again is a variable quantity, soft and porous papers requiring more gelatine to size them than hard, rough surfaces will take up. The bath should be used hot, so that it is thoroughly absorbed. The exact time of immersion—for the paper is put in bodily, not floated—does not matter, and it will be often found necessary to let the first sizing dry and then to give a second bath later on, that the pores of the paper may be well filled up.

You can salt half a dozen or more sheets at once, turning them over from time to time and then hanging them up by American or other wood clips to dry.

At this stage the paper will keep indefinitely, but it is as well to keep it under pressure that it may be easier to manipulate in the subsequent process of sensitizing. The stronger the salting the weaker may be the sensitizing, and there is room for considerable variation in both according to the character of the negative you are going to print from and the result you want to get.

The paper is now ready for sensitizing, and this is done on any of the ordinary silver baths used for albumenized papers, the standard being

60 grains Nitrate of Silver,
to
1 oz. of Water(preferably distilled)
and
15 grains of Citric Acid.

This, with occasional strengthening, will last for a long time kept in a dark place in a stoppered bottle.

SENSITIZING.

Take your salted paper by the right hand corner and float it on the bath, using gentle pressure at the same time to exclude air bubbles, (which would come out as insensitive spots in printing), leave it floating for 2 or 3 minutes, then hang up to dry in a moderately dark room until it is ready for use.

I have found it always better to sensitize paper slightly damp, since one can get a more even coating, and the edges do not curl up in the provoking manner common to papers when dry, but care should be exercised to avoid the sensitizing solution coming on to the back of the paper.

PRINTING.

This is done in the ordinary manner in a pressure frame, but the image may be taken rather darker than with ordinary albumenized papers to compensate for subsequent loss in toning and fixing. But be sure to varnish

your negatives before printing, to avoid staining them. I cannot explain it, but the fact remains that although I have never had staining occur with albumenized papers, with the use of strongly salted and sensitized drawing papers, such an occurrence has been frequent, and although there are several reputed cures for such staining, I never yet found a satisfactory one.

TONING.

Any bath that will tone albumenized prints will act perfectly well with plain salted papers, but to obtain a rich red brown with what are called "juicy" depths in the shadows and undegraded whites in the high lights. use the following stock solution :

15 grains Chloro-platinite of Potassium
in
½ oz. of Water.

Then, when you have prints to tone, take from it one dram mixed with 4 oz. of water with a few drops, say 5 or 6, of Nitric Acid.

This bath will be found to tone very rapidly and it will keep fairly well. Toning being completed, wash for a minute or two and neutralize your prints in a weak bath of Carbonate of Soda, they are then ready for fixing in the usual way.

FIXING.

Hypo-Sulphite of Soda,	4 oz.
Water,	20 oz.

I look upon thorough fixing as necessary to ensure permanency as is thorough washing in running water afterwards, and prints should be left in the fixing bath for at least 15 minutes before they are put in the washing trough, where they remain for at least a couple of hours.

I came across a print on plain "Saxe" paper done by my father at least 30 years ago and it is as fresh and bright as on the day it was made. It was a point with him to dab each separate print with a sponge under running water, back and front, for a considerable length of time, and I have never seen such little change in color of silver prints as are to be noticed in his.

When your prints are well washed, I take it that you have got as near to permanency as that unstable metal, silver, will allow, and although the directions for the manipulation of plain paper seem formidable enough, they are not really more so than would be required for the intelligent use and practice of any other printing-out process.

Still, for those who do not want the bother of preparing their own

paper, there is one very much of the same grain and texture as platinotype, sold under the title of the "Blackfriars Matt."

I mention it with diffidence, since I am interested in it to some slight extent, but, as a matter of fact, I know of no other on the market, as that prepared by my old friend, Valentine Blanchard, has been withdrawn for some years, and another, known as "Mezzotype" which was issued by the Carlotype Co., has suffered a similar fate. With this paper, which is a chemically pure one of French manufacture, any tone, from warm red to black, can be obtained by the use of the platinum bath, and its approximate permanency is tolerably certain.

There is another method of obtaining prints on plain paper, which has been duly laid down by Lyonel Clark in his contributions to the *Camera Club Journal* of a few years ago, by developing an under-printed picture with a saturated solution of Gallic Acid or Pyrogallol Solution acidified with Acetic Acid. Mr. Clark also recommends the use of Arnold's pure unbleached paper in preference to any other. This is made of linen fibre instead of cotton rags and is free from chlorine or bleach in any form. Besides "Arnold" there is imitation "Creswick," which is rather more expensive, but of a fine color and texture for this kind of work. Being a heavy and thick paper (110 lbs. to the ream Royal) it requires considerably more gelatine in the sizing than Whatman, and I have sometimes found double sensitizing advantageous in obtaining strong prints.

There are again Joynson, Michallet and Ingres papers, all of which are suitable for salting, and some of the latter being in delicate tints open up new ground for photographic workers.

Carbon Printing.

JAMES A. SINCLAIR.

It is very doubtful whether any process so completely fills the requirements of the artistic photographer as does the carbon process. Its long scale, reproducing perfectly every gradation of the original negative, its permanence, its great variety of color, its wonderful transparency in the deepest shadows, and its adaptability to any surface, all combine to render it the most perfect of photographic printing methods. Sometimes, indeed, its very perfection is a barrier to its use. If we have to print from a flat, thin negative in carbon, we shall certainly obtain a flat, thin result, but for a negative with a very full scale of gradation, especially large and enlarged negatives, it is the process par excellence. Year by year it gains steadily in favor, and our exhibitions have greatly improved in general appearance by the variety of color it has given to their walls. In this short article it is my intention to give a brief outline of the process, embodying the salient points, which, if followed by the tyro, should ensure his success, but at the same time I would recommend him, after he has mastered the initial difficulties, to read some text book and make himself thoroughly acquainted with all the details and higher branches of the subject. Carbon Printing, as we know it to-day, is based on the fact that a mixture of gelatine with a chromic salt is gradually hardened and rendered insoluble on exposure to light. If, therefore, paper is coated with such a mixture of sensitized gelatine, containing any permanent pigment—Carbon was originally used, hence the name of the process—and if this paper is placed underneath a negative and exposed to actinic light, we shall have a positive image formed, consisting of soluble and insoluble gelatine; insoluble in exact proportion as the light has reached the surface of the pigmented compound. Development consists in washing away with hot water those portions of gelatine which the light has not affected sufficiently to render insoluble. Now, without going more minutely into details at this stage, and perhaps frightening the beginner with imaginary difficulties, I would assure him that the process only needs care, cleanliness and exactness at every stage in order to ensure success.

To those taking up Carbon Printing for the first time, a start should be made with the "Single Transfer Process". This is the simplest form and

has some advantages over the "double transfer" because less manipulation is required, and, moreover, it is easier to produce prints on rough drawing papers by its means. The only objection to it is that everything becomes reversed; what was on the right hand side of the original is now on the left hand side of the print, but this is of little moment for purely artistic work. Of course, where enlarged negatives are required, specially for Carbon Printing, they are usually made reversed, and such will give a true result after printing by the single transfer process. Eastman films may be printed through the film itself, i. e., with the celluloid side in contact with the "tissue"—as the pigmented printing paper is technically called—and the resulting print will render the picture in its correct aspect.

REQUIREMENTS FOR THE SINGLE TRANSFER PROCESS.

Carbon Tissue,
Black Varnish or Lantern Slide Binders,
Single Transfer Paper, a little larger than the negative.
A Flat Squeegee—not roller.
Squeegeeing Board.
Bichromate of Potash.
Camel's Hair Mop Brush.
Thermometer.
Alum.
Actinometer.
Blotting Paper.
3 Dishes (2 for cold water and one for Alum Solution).
1 Developing Tank or large basin to hold hot water.

SENSITIZING THE CARBON TISSUE.

Carbon Tissue is the name given to the paper coated with pigmented gelatine and may be purchased from the photographic stock dealers in almost any desired color. When insensitive, it will keep in a dry place almost indefinitely. Should the beginner be able to purchase it ready sensitized, he is advised to do so, because tissue sensitized in the making is usually manufactured from softer gelatine and consequently development is easier and quicker. Sensitizing is, however, a very simple operation, and if done at night the tissue is ready for use when dry the following morning and will keep in good condition for about a fortnight, although, when preserved in a calcium tin, such as is used for platinotype paper, its longevity is very greatly prolonged.

The sensitizing solution is made as follows:

Potassium bichromate,	1 oz.
Water,	20 ozs.
Ammonia,	5 drops.

The temperature of this solution should not be over 65°F. In summer it may be necessary to cool it with ice. A dish, somewhat larger than the tissue, should be filled to the depth of about one inch with solution. The tissue is now immersed in it, care being taken to avoid air bubbles as much as possible; but, should they occur, either on the back or front of the tissue,

they must be quickly removed by lightly brushing the surface with the camel's hair mop. The usual time for immersion is about three minutes, but this varies greatly according to the temperature of the solution. A good plan is to remove the tissue immediately it becomes limp, placing it surface side downwards on a squeegeeing board—a plain board covered with sheet zinc—and then removing the surplus moisture with a stroke of the squeegee. Should a squeegeeing board not be available, a sheet of plate glass forms an efficient substitute. The tissue is now raised from the board and hung up to dry by means of clips. The tissue does not become sensitive till nearly dry.

DRYING THE TISSUE.

The greatest care must be taken that this operation is carried out under suitable conditions, for after success depends very largely upon it. It is advisable to dry the tissue as quickly as possible and in an atmosphere free from all impurities. A properly constructed drying cupboard is very useful for the purpose, although an ordinary room in which the fire has been burning during the day and which has been darkened to prevent the entrance of white light, will do just as well, and tissue left there at night will be ready for use the following morning. Care should be taken not to expose the tissue to even the weakest actinic light, because it is more sensitive than silver paper, and, moreover, any light action set up, continues when the tissue is placed in a dark place. The tissue being quite dry, it is stored in a pressure box ready for use.

PREPARING THE NEGATIVE.

Negatives for carbon printing should be vigorous and full of gradation. Do not attempt your first print from a flat, thin negative. Each negative must be provided with what is termed a "safe edge." This is made by painting round the edge of the negative with black varnish, or by sticking a strip of black or yellow paper round the negative on the glass side. Commercial lantern slide binders are very convenient for this purpose because they can be affixed in a few moments. Without this safe edge there is great danger of the insoluble gelatine picture leaving its support during development.

PRINTING—THE ACTINOMETER.

The negative being prepared we have only to place it in a printing frame, with a piece of the sensitized tissue in contact, and expose to daylight as in any ordinary printing process. Now as we are printing on a dark

colored surface it is evident that we must have some means for calculating the necessary exposure. Instruments for this purpose are known as Actinometers, and any of the commercial forms will be found quite simple in use after one or two trials. An alternative to their use is to take a negative of equal density to that we are printing in carbon, and, placing it in a frame with a small strip of Solio paper, expose the frames simultaneously to daylight. When the strip of Solio paper is printed to the "pretty" stage, i e., lighter than it would be for toning, we may consider our carbon print is finished and ready for development.

If we pause for a moment to think of what has taken place during printing, we shall see that the image of insoluble gelatine lies on the surface of the pigmented film instead of in contact with the paper supporting it. It follows, therefore, that if we place the "tissue" in hot water, the gelatine between the image and the paper will be dissolved and the insoluble film forming the picture will float away and be lost. Of course this difficulty might be overcome by printing through the paper, but this procedure would give rise to other troubles. The grain of the paper, the long time taken in printing—even when the paper is oiled as suggested by Mr. Blanchard—and the loss in definition, are serious obstacles to the success of this method. The difficulty has been met in a simple manner. If the printed tissue is placed in water for a few moments and then brought into contact with a flat surface excluding air, it will adhere during development. We, therefore, prepare wood, paper or other material on which we desire to transfer our image, by coating it with a layer of insoluble gelatine. Single transfer papers, smooth or rough, white or tinted, may be obtained ready for use, but probably the ideas of the photographer lead him to sometimes require something different to the commercial article and he will prefer to prepare his own. For this purpose take :

Nelson's No. 1 Gelatine,	1 oz.
Water,	2 ozs.

and after letting it soak for some hours, dissolve by gentle heat. Add to this solution very gradually

Chrome Alum,	20 grains dissolved in 2 ozs. water.

stirring vigorously all the time.

With a stiff brush or sponge the chromated gelatine is applied to the surface of the wood or paper and allowed to dry. Ordinary papers require two coats, but Whatman and other rough drawing papers should have three. Should Nelson's Gelatine not be procurable, any other make may be used in its place, but if they are harder the alum must be greatly reduced. Should Heinrich's Hard Gelatine be used, about four grains of Alum would be sufficient. A larger quantity might cause coagulation during mixing.

DEVELOPMENT.

The print being ready for development, we prepare two dishes of cold water, one dish of five per cent. Alum Solution, a tank or basin of hot water about 100° F., a squeegee and squeegeeing board. Taking a piece of the single transfer paper, rather larger than the print, we immerse it in one of the dishes of cold water for a few minutes. (Whatman and other rough drawing papers should soak for hours, or else be placed in the hot water developing tank for half an hour before use.) The printed tissue is taken from the frame and placed in the dish of cold water which contains the transfer paper, bubbles being carefully avoided. It usually commences to curl up and then gradually unfolds itself again. When nearly unfolded it should be brought into position, film downwards into contact with the prepared surface of the transfer paper. Lifting both tissue and transfer paper by the one edge, drag them out of the water over the end of the dish and lay them "tissue" side uppermost on the squeegeeing board. Now apply the squeegee vigorously to the back of the tissue in order to expel all the water between the two surfaces. The transfer paper with the adhering tissue is now gently lifted and placed between blotting boards and kept under slight pressure for about twenty minutes. At the end of this time, the transfer paper with the adhering tissue is placed in the tank of hot water at 100° F. In a few minutes we shall see small quantities of soluble gelatine exuding round the edges of the tissue. We now take one corner of the tissue and lift it right away from the transfer paper. Unless it comes quite easily and without force, it should be allowed to soak longer. The tissue being removed, a dirty mass is seen on the single transfer paper. All we have to do is to leave this mass with the hot water till development is complete. It is well to have a sheet of zinc or glass on which to support the picture during this operation, or the paper support may get damaged. Errors of exposure may be partially compensated at this point. Over-exposed prints may be reduced by raising the temperature of the hot water to 120° or 130°F ; while under-exposed ones should be left to automatically develop, face downwards, at a temperature of 90°F. When the print is developed, it only requires a rinse in cold water, immersion in the 5% Alum Solution for 10 minutes to harden the film and remove the bichromate salt, a final wash to remove the alum, and the print is then hung up to dry by means of clips. When dry the prints may be mounted with any good mountant or starch paste.

DOUBLE TRANSFER PROCESS.

As pointed out earlier in this article, the foregoing method reverses the picture unless a negative has been specially made for single transfer in the first instance. For direct prints where reversal would be objectionable, we must use the double transfer process, which is quite as easy to work as the single transfer, but involves one more operation.

The additional materials required are,

Temporary Support, Final Support, Waxing Solution.

With this process the procedure is exactly the same as regards the printing and development, the only difference being that a temporary support takes the place of the single transfer paper. A flexible temporary support is manufactured specially for this purpose. If it cannot be procured, a sheet of finely ground opal will serve the purpose equally well, provided the print is to be finally transferred to paper or other flexible surface. Whichever is used, the surface must be first prepared with waxing solution. This is composed of :

Yellow resin, - - - - - - - -	36 grains.
Pure bees-wax, - - - - - - -	12 grains.
Ether, - - - - - - - - -	2 ozs.

After melting the wax, add the resin and thoroughly mix, remove from the fire and add the Ether.

A small pool of the waxing solution must be poured in the center of the opal or flexible temporary support, and this is then rubbed all over the surface with a piece of clean flannel. Allow to stand for a few minutes and then lightly polish with another piece of flannel. Directly the smell of the Ether has gone, the support is ready for use and may be kept in this condition.

The print being developed, alumed, washed and dried, on the temporary support, is ready for the final operation. We cut a piece of the final support, a paper somewhat similar to single transfer paper, but coated with a thicker couch of more soluble gelatine, and place it in a 2% Alum Solution about an hour before required for use. The print on its temporary support is now immersed in tepid water, 70°F.; the final support is withdrawn from the Alum Solution, lowered into the tepid water, avoiding bubbles, so that the gelatinous side comes in contact with the print. The temporary and final supports are now withdrawn from the water together, placed on the squeegeeing board, the final support being uppermost, and brought into perfect contact by the vigorous action of the squeegee. When perfectly dry, the print will leave the temporary support without difficulty, indeed if dried in a warm current of air it will probably fall off without our aid.

Where opal is used, it may be necessary to insert a knife at the edge of the print. The temporary supports are not damaged by these operations and may be used for a large number of times, if waxed after each time of using.

In conclusion, I would urge every serious photographer to master this fascinating process, for, till he has done so, he must be unaware of many of the possibilities of his art.

The Gum-Bichromate Process.

ROBERT DEMACHY.

When a photographer has had the courage to go through some technical article on the working of a new printing process, he feels the joyous conviction that on following closely the author's instructions he will be able to produce a good print by the process as described ; at any rate he knows beforehand what qualities this standard print ought to have. I do not see the way to produce this happy confidence in the present case, for although I think I am capable of giving a definition of what a good albumen or gelatino-chloride print ought to be, by comparison with a bad one, I am quite unable to define *the* good gum-bichromate print, and no instructions of mine will enable even an ardent worker to produce what a true artist will call a good gum-bichromate print. All that I can do is to enable him to produce a sheet of coated paper, the coating of which will dissolve and disappear in the places where light has not caused insolubility, while in other parts this coating will remain more or less adherent, according to the quantity of light admitted.

This is the definition of the process in a nut-shell : What we want is a film—a colored coating which, after exposure to light under a negative, will give us a surface quite soluble in some parts, partly soluble in others, totally insoluble in the rest. If we succeed in manufacturing this sheet of coated paper we shall have in our hands the foundation of a good gum-bichromate print—it rests with us to make a picture out of this, or a daub, or simply a common-place, faithful, photographic print.

For in the gum-bichromate process we cannot work with the same standards as in other processes. For example, in the silver printing process, under-exposure gives a very bad print of a dirty color without strength or contrast. With gum-bichromate, considerable under-exposure means total absence of image. One cannot say that the print is a bad one, for in this case there is no print whatever, all the coating will disappear in the developing. Similar with great over-exposure ; in this case the paper remains just as it was before printing—a dull surface of black, brown or red. But whenever an image has been developed and has remained on the paper the resulting print may be good, for it can be made into a picture, and a fine picture, too, if the man who works at it is an artist and knows what he is about.

My meaning is that if the color used for coating is well chosen and sufficiently deep, its nature will not be affected subsequently as it is by toning or developing from white to black in other printing processes, so most of the conditions which cause failure in silver chloride, bromide or in platinum papers are not to be taken into account with this special method, for color and depth of color have both been chosen before printing and development. In other words, as we work from dark to light, the conditions of ordinary printing are naturally reversed. What we aim at is to keep the color that we have already applied instead of striving to build it up.

The materials sre simple : Gum Arabic, Bichromate of Potash, and the cheapest of all pigments—earths. The gum need not be pure white gum, the ordinary red Gum Arabic works just as well as the purer samples. I have tried both and found no difference whatever in the results. Bichromate of Potash can be had of any druggist. Any sort of paper is suitable provided it is sized ; all drawing and water-color papers are good, so are most writing papers, but highly glazed paper is most difficult to coat properly, though it works well when this difficulty has been surmounted.

Powdered colors may be used successfully—they are cheaper than moist tubes, but they are not ground so fine. To make the three conventional tints of monochrome work, the following colors are necessary :

Lampblack, umber and burnt umber, sienna and burnt sienna, Vandyke brown, bistre, yellow and brown ocre, red ocre, brown red, Venetian red, indigo. These colors are permanent. They can be mixed in different proportions according to the taste of the worker. No colors should be used pure, the result is generally displeasing.

A saturated solution of Bichromate of Potash (10%) is made with hot water, and another of gum arabic and cold water which has to be worked up to a density marking 18 to 20 degrees by the saccharometer or densitometer. The Bichromate solution keeps indefinitely. The gum solution turns acid after a few days and seems to give better results in this state. If it thickens by evaporation or gets thinner by fermentation, a small quantity of water or a denser solution must be added until it registers a new 18 to 20 degrees. Ten cubic centimetres of this gum solution are mixed with pigment and four cubic centimetres of Bichromate are added to the gum and pigment. It must be understood that these measures are purely approximate. According to the depth of color or to the nature of the pigment, more or less gum or more or less Bichromate will have to be added. The photographer will be guided by the behavior of the sensitive mixture, which must allow of rapid and even coating. For example, if he uses Venetian red as pigment the resulting mixture will be thin compared to a mixture prepared with Vandyke brown, for the coloring power of the first pigment is greatly superior to that of the latter, consequently there will be much more pigment

in bulk in the second case than in the first and a few drops of Bichromate and one or two drops of thin gum will have to be added. In reality every proportion is constantly varying in this process, the only important and unvarying factor should be the thickness of the sensitive mixture, for smooth and even coating is a necessity, and only a certain thickness will allow of proper coating. This is a matter of experience to be acquired by a few preliminary trials, though I have worked at the process for several years and it is rare indeed when I do not find it necessary to thicken or dilute the sensitive mixture before beginning to coat.

Now two methods of working are open to the photographer, either he may sensitize his paper in a ten per cent. solution of Bichromate by immersion during one or two minutes, dry, and then coat with gum and pigment, adding to the mixture a proportion of water equal to the quantity of fluid that the Bichromate solution would have brought if it had been added to the gum and pigment, or he may coat his paper direct with gum, pigment and Bichromate in the proportions described above. In both cases the degree of thickness of the mixture must be tried before coating, and this operation must only be performed when the mixture has shown a satisfactory behavior under this preliminary trial. It is not difficult to judge. A mixture clinging to the brush and forming ridges which cannot be softened by repeated brushings must be diluted—while if it runs over the paper, refuses to set and follows the brush in waves, gum must be added.

I do not say anything about the proportion of pigment—this is a question of personal taste.

Coat your paper in full diffused light or by bright gas light. Pin the dry sheet on a drawing board, take a flat hog's-hair brush (the fan shape seems to be the most convenient) smear the surface roughly with the sensitive mixture, taking care not to use more than is necessary for the complete covering of the sheet, or else the coating will be too thick. This rough coating is covered with ridges and irregular brush marks; do not let the marks set but take up a goat's-hair softener and give a few strong downward vertical strokes which will change the irregular ridges into vertical parallel lines—break these lines by several horizontal strokes perpendicular to the first—the lines will merge into one another and disappear. A few rapid and light touches here and there will finish the operation, which ought to be rapid and decisive.

Pin the paper up to dry in a dark place—absolute darkness is not necessary—and when bone dry, expose.

Correct exposure, I mean the right exposure for the desired effect, is the delicate point of the process. It can only be got at by comparative trials. I have seen men disgusted by their constant failures, who, as I found out later on, had never made these comparative trials on the same

negative. They had tried every possible change in their way of coating and their proportions of mixture, but had never had the idea of trying two exposures—one of ten minutes and one of two hours—to ascertain how gum-bichromate paper acted under extremes. It is, notwithstanding, the only sure way. An actinometer is necessary, of course, and the bands, numbered, may be kept for future reference.

The average exposure in summer by diffused light for a thin negative would be twenty minutes to half an hour. Length of exposure is influenced not only by the quality of the light, the color and density of the negative, but also by the thickness of the sensitive coating. It is of course in direct ratio to this thickness.

To be able to fully understand the importance of control in the development of a gum-bichromate print we must realize that the film or coating on which we are going to operate is composed of a substance uniform in appearance, but entirely soluble or semi-soluble in some parts, and insoluble, or nearly, in others. If we immerse this coated paper in a dish of water and let the solvent act undisturbed on the whole surface of this coating, it will dissolve it proportionately to the extent it has previously been rendered insoluble, and it will give us a positive duplicate of the original negative. If, on the contrary, we apply the solvent irregularly to different parts of the coated paper, if we use hot water there and cold water there; if, going even further in our personal intervention, we add local friction to the dissolving action of water locally applied, we produce a positive which has not been developed in proportion to its solubility, but proportionately to the temperature of the agent used in developing and to the force and frequency of its application—consequently it is not a duplicate of the original negative as to tone and values, but the result, good or bad, of our own judgment.

In reality the technical or photographical part of the process is at an end when development begins. Development requires no chemicals, and no formulæ to mix them. All you have to do is to wash away, rub away, or scrape away, according to your mood, the more or less soft pigment attached to the paper. You can develop in ten minutes or several hours, wash away one side of your picture before developing the other, work with a brush, a spurt of water, or a gentle flow. So there are no rules for developing save those by which artists of all crafts ought to be guided.

The only indications which could be useful to a beginner are the following: Always develop the print out of the bath of water; if it is immersed it stands to reason that local development is impossible. Place the sheet of paper on a glass plate propped up at one end by some sort of wooden contrivance, the other resting on the bottom of the developing tray. Always begin by cold water, and never use higher temperatures until you have ascertained that a low temperature has no effect whatever.

Develop slowly, and do not let an ounce of water flow over the film without a definite intention calculated to produce a definite effect. If hot water does not reduce the heaviest shadows use a very soft, flat sable brush, but not until the print is completely developed in other parts—then work carefully, and bear in mind that the deepest blacks are the foundation of your picture, and that should they be over-reduced the whole balance of the composition will be upset. Do not imagine that after having successfully (from a technical point of view) developed a gum-bichromate print you have got all that you can get out of the negative; print another proof and yet another—try different exposures, modify the temperature of your bath, change the scheme of tone, use another batch of paper coated with a mixture of different proportions, and you will be astonished at the variety of effects thus obtained—each one, though quite different from the others, being able to give a true and pleasing impression if the relative values have been kept in harmony in the various schemes of tones adopted.

Failures may be divided into four classes:

1. The coating is completely washed away in a few minutes or after being successfully developed, seems to lose all cohesion and instead of drying, melts and spreads, ruining the print absolutely—cause, under-exposure.

2. The coating is absolutely insoluble or only a trace of image is visible—over-exposure.

3. Development proceeds normally but the whites are stained or marked with granular spots of color.—(1st case) color-stained whites, cause: excess of liquid, Bichromate or water in the sensitive mixture. (2nd case), granular deposit, cause: excess of pigment.

4. The coating, on developing, breaks into scales. Cause: extra thick film to which extra exposure has not been given. We must not forget that the time of exposure is regulated not only by the color and the density of the negative and the amount of actinic light, but also by the degree of thickness of the coating. A thick coating will always produce scaly development when the same exposure has been given as if the coating was of normal thickness.

Gum-bichromate prints may be dried before a fire or over a gas stove, if the color does not exhibit any symptoms of spreading. If it is in the least tender, accelerate evaporation by fanning. As a rule, however, I prefer to let the print dry naturally, for many successful alterations in value can be made when the coating has thickened somewhat and is less delicate under the brush.

The prints when quite dry must be passed for a few minutes in a clearing bath of water and bi-sulphite of soda (1 %) to eliminate the last traces of Bichromate.

Is it useless to add, before finishing, that we do not consider a photographic print to be beautiful simply because it is printed by the gum-bichromate method. We like the process and we are doing our utmost to popularize it, only because it allows of great control over tones and values and because in the hands of men who have acquired and cultivated artistic vision it can give an astonishing range of varied effects. The opening paragraph of this article may have seemed paradoxical to the reader at first sight; if he has gone through the whole of it he will acknowledge that success in the technical part of the process lies solely in the manufacturing of a sheet of coated paper, the coating of which is able to disappear in certain parts only under the action of washing or friction, while other parts retain their color. This paper will give us an image, but it is the artist who will "do the rest". He will make the picture.

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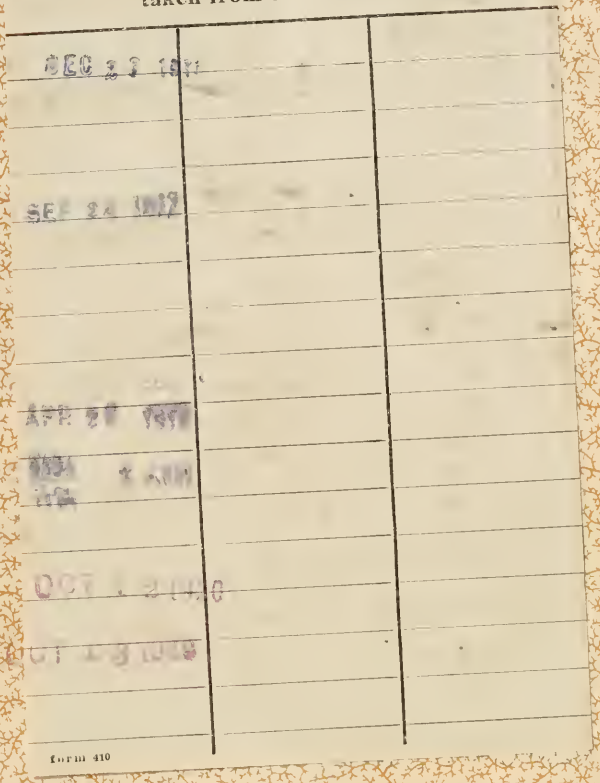

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